



FRIDAY, OCTOBER 11, 1895.

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Contributions.

The Baldwin Tests at Purdue.

Purdue University,
LAFAYETTE, Ind., Oct. 3, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

My attention has been called to an article entitled "Tests on Cylinder Condensation on the Baldwin Compound Locomotive at Purdue University," which appears in your issue of Sept. 20th. As Director of the Engineering Laboratory of Purdue University, I have an interest in anything connected with its name. It is proper, therefore, for me to say that while the article correctly describes and illustrates Purdue's Baldwin compound locomotive engines, its publication was unauthorized. All tests thus far made upon these engines have been of a preliminary character, and no data of tests has been given out for publication.

I do not know the source of your information, but long acquaintance with the *Railroad Gazette* assures me that you would not knowingly become a party to the premature publication of laboratory data.

W. F. M. GOSS.

[Of course we had not the least reason to suspect that the publication of the article referred to was unauthorized. The Faculty of Purdue University cannot regret its premature publication more than we do.—EDITOR RAILROAD GAZETTE.]

The Quincy Railroad.

PITTSFIELD, Mass., Sept. 19, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You are in error at least partially in your review of Early Railroad History, when you say of the Quincy Railroad that "the track was stringers resting on stone cross-ties." A considerable part of this road is still to be seen, and shows very plainly the manner of its construction. Stone stringers, averaging perhaps 6 ft. long, and similar in appearance to the granite edge stones of a city sidewalk, were laid end to end, and long strips of iron about 4 in. wide by ½ in. thick were secured to the top.

Many years ago I saw a section of the old Atlantic & St. Lawrence Railway, which seemed to me to be built with cross-ties every 3 or 4 ft., on which were laid wooden stringers with a flat iron plate on the top. These stringers, I should think, were of spruce timber 6 x 8 or 6 x 10 in. cross-section. This kind of construction (if ever used for passenger traffic) was not long in existence, being soon replaced by the η section of iron rail, which was continued in use up to about 1870 (?).

GEORGE W. BLODGETT.

[This letter refers to a review published in our issue of Sept. 13, page 608. Mr. Wilson's words describing the track of the Quincy Railroad are, "it was formed by laying stone sills crosswise 8 ft. apart, upon which were placed wooden stringers 6 in. x 12 in. plated with flat-iron bars." Ringwalt, in his history of "Transportation Systems in the United States," describes the track in the same way, adding that the iron plates were 3 in. wide by ½ in. thick. Mr. Wilson's railroad career was begun in 1827, just about the time the Quincy Railroad was built, and he began writing his railroad note books at least as early as 1831. It is possible, however, that he did not record so early as that the facts of the Quincy track and that he may have been mistaken.

Concerning the Philadelphia & Columbia track he could not well have been mistaken. There he was employed from the beginning of the work and of that he preserved contemporaneous notes. Of a total of 163.3 miles of track on that road 6 miles were laid with granite sills not less than 3 ft. long, not less than 1 sq. ft. cross-section laid end to end. On these were iron plates 2½ in. x ½ in. x 15 ft.; 18 miles were laid with wooden stringers plated with the same flat iron, and the rest was laid with "edge rails" on stone blocks connected by cross ties. These rails were 3½ in. deep and weighed 41½ lbs. per yard.

The use of flat iron plates on wooden or stone stringers began very early—long before the use of locomotives—and a survival of this practice is found to day in the English name of the trackman "plate layer." The precise date at which this improvement was begun seems to be lost. Haarmann in his wonderful work, "Des Eisenbahn-Geleise," puts it before 1730, and Ringwalt also accepts this as a possible date. Nicholas Wood in his "Practical Treatise on Railroads" does not attempt to fix a date, but it began undoubtedly before the beginning of the last quarter of the 18th century. Ringwalt quotes Horatio Allen, Chief Engineer of the South Carolina Railroad (10 miles operated in 1830 and 75 miles in 1833) as saying that that track was built of 6 x 12 in. wooden rails plated with iron 2½ in. x ½ in. Ringwalt further says that in 1839 most of the railroads of the United States were laid with plates. Some of us who had the fortune to spend our boyhood among old-fashioned people remember vividly the stories of the "snake heads" which used to curl up and pierce the bottom of the cars.

The plates gave way first to the edge rail of various patterns and to the T-rail of Mr. Robert L. Stevens, and the η -rail was never used much in the United States. Haarmann, on the authority of Colburn and Holly, says that it was first laid here in 1835 on the Susquehanna & Wilmington Railroad, and it was found on the Baltimore & Ohio in 1843, the section there in use weighing 51 lbs. per yard. Ringwalt says that portions of the Western (of Massachusetts) were laid as early as 18.0 with a η -rail. The town from which Mr. Blodgett writes is on the line of that railroad, and it is easy to understand that he has found traditions there of the η -rail.—EDITOR RAILROAD GAZETTE.]

Pure Air in Passenger Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The very sensible article in the *Railroad Gazette* of Sept. 20 on Car Ventilation opens up a subject which should interest every person who rides on steam or street railroads. Pure air is a necessity to health and the human system can much better endure bad food or bad water than it can vitiated air.

Let us see what is required in passenger cars.

A car 60 ft. long, 8½ ft. wide and 9 ft. high contains about 4,500 ft. of air space, deducting for seats, passengers and luggage, we have left, say, 4,000 cu. ft. Each passenger inhales 20 cu. in. at each inspiration, and breathes about 17 times a minute. This air, when exhaled, vitiates a much larger volume and experts agree that every man requires 50 cu. ft. of pure air a minute. Thus, 60 passengers in a car would require 3,000 cu. ft.—three-fourths of all the air contained in a car every minute. This being the fact, some means of replacing the vitiated air with pure air should be introduced and that without draft, dust or cinders. Can this be done? and at what cost?

There are two cars, one a smoker, the other an ordinary passenger car, which are now running on the Boston & Maine, and have been for several months, which do furnish a complete change of air every minute while running at the usual speed with all the windows and doors closed; and that without draft dust or cinders. These two cars are cooler in summer, and warmer in winter, and require no attention or repairs, so far as the ventilating arrangement goes. It costs nothing additional in building new cars, and can be applied at a slight cost to cars already built. These are facts which thousands will testify to. Let us all have plenty of the cheapest and most necessary essential to health—pure fresh air.

C. M. FULLER.

Why the Manchester Ship Canal was Built.

LONDON, Sept. 21, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

From time to time there appears in your journal something concerning the rather unfortunate position of the Manchester Ship Canal. Now, while admitting an apparent enmity between canals and railroads, it is not a little strange to find the *Railroad Gazette* being used to decry the English canal. The *Railroad Gazette* is the representative of American railroad interests, which live upon transportation rates which are exceedingly low. Had the freight rates between Liverpool and Manchester and that district been only several times what similar rates are in America, then the Manchester canal would never have been even thought about. For a dis-

tance of 30 miles a rate of \$3 per ton of practically undamageable raw cotton will be admitted as rather stiff. I am perfectly in accord with you that there was very little physical necessity for the canal. The necessity was wholly moral. Deputations without number had waited upon the London & North Western Railway without result. Even when the canal was threatened the Manchester people were told by the railway company "we defy you to make your canal." It was only when Lancashire's industrial life was in jeopardy that the people were roused to make an effort. At the time I was a resident in Manchester and my interests were bound up in the place. We all recognized that we might as well put a few dollars into the concern as be starved out by the railway rates, and I believe I am but stating the case of many others when I say that I took shares to the extent I could afford to lose and divided them among my family with no expectation myself of ever drawing a dividend from the investment. In this way, if you inquire, you would find large numbers of children to be shareholders.

Now as to the returns. Freights have been reduced and the railroads are now carrying freight for much less than they were doing. The shareholders in the canal are not drawing a direct dividend, but the whole of South Lancashire and West Yorkshire trades are in a better position, and undoubtedly every inhabitant is drawing an indirect dividend as the result of the presence of the canal. I need not say anything of the jobbery which went on in connection with the construction of the canal. The management somewhere was disgraceful, but this is no argument against the canal itself, and I venture to say that if the railroads of America were to put up their rates to even half the rates still prevalent in Lancashire the country would be bankrupt in a week, and all business at a standstill.

The City of Manchester can well afford a rate to maintain the canal until it has turned the corner. Far more is coming back already. Manchester has access to the sea, and the wisdom of this cannot be gaged by the superficial outlay any more than that you can question the wisdom of spending a hundred dollars on rent of a seaside cottage in summer when you have a home in the city to pay rent upon as well. No man has a right to question the wisdom of building the Manchester Ship Canal unless he lived in Lancashire in the pre-canal days, knew the feeling of the people in the matter, suffered by the extortionate rates, and has not allowed his memory of all these things to be dimmed by lapse of time. Had the canal been constructed a few years earlier I might still be writing from a Manchester address in place of having been squeezed out by the depression which was on the place, but in that case I should probably have been unable to subscribe myself

M. AM. SOC. C. E.

[Do you call it "decrying the Manchester Ship Canal" to report fairly its financial condition? Our reports have not been matters of sentiment, but of fact. We are not carrying on a propaganda for or against canals in general, or this one in particular, but telling the truth so far as our limitations of space, money and intelligence permit.

We do not admit as a general proposition that there is actual "enmity between railroads and canals"; but are willing to admit, with our correspondent, that there is an "apparent enmity." On the contrary, it seems to be a pretty safe general proposition that what adds to the prosperity of a nation adds to the prosperity of its railroads.

Our point is that individuals, towns, states or nations ought not to be lured into building canals or railroads by false pretences. They ought to count the cost and the probable return, and to know what the deficit will probably be and who is to pay it. This was our position with regard to the Nicaragua Canal, and we are very well satisfied with the result which we helped somewhat to bring about. The United States have not yet been committed to the expenditure of unknown tens of millions in that enterprise. We deny that a canal, any more than silver, has any sacrosanct quality which puts it beyond discussion. So, if a canal cannot live from its earnings let us know it. If all the people are to be taxed that some of the people may have cheaper freight rates let us understand it.

We can not pretend to judge whether or not the Manchester ship canal is worth to the people of Lancashire what the rate-payers of Manchester will have to pay for it; nor can we judge how much of the depression of trade in Manchester is due to high freight rates. But granting that the railroads were squeezing the life out of Lancashire (which we do not grant) the community could have controlled freight rates by the expenditure of one-tenth of the cost of the Manchester ship canal. We should suppose that a very efficient railroad could have been built from Manchester to deep water on the Mersey, including docks and terminals for \$7,500,000—not a great railroad, but one of sufficient capacity—and this in the control of the public would have governed freight rates as effectually as the canal, and passenger rates besides, which the canal cannot affect. But the Manchester Canal is a very useful object lesson, and must often serve to point our moral.—EDITOR RAILROAD GAZETTE.]

The Long, Coal-Car Dumping Machine.

The apparatus recently erected on the dock of the New York, Pennsylvania & Ohio Railroad at Cleveland, for unloading coal by overturning the whole car, was built under the patent of Mr. Timothy Long, who has been connected with the Excelsior Iron Works Co., of Cleveland, for several years; and the machine was erected by that company. The engravings shown herewith give a good idea of the appearance of the machine, which is simple in design, although large and seemingly costly for such a commonplace function as unloading coal.

The main feature of the apparatus is a large cylinder, which forms a through bridge span in the middle of a trestle 28 ft. high, running parallel to the side of the

has not yet been fixed as it will finally be. It consists essentially of a longitudinal beam at each side of the car, to be held in place by transverse levers, and which can be adjusted by hydraulic pressure. Even under the temporary arrangement, the beams being wedged in place by hand, the machine has unloaded 5 cars in 11 minutes and 18 cars in 1 hour.

Mr. Buchholz, Chief Engineer of the railroad company, who has supervised the construction of the machine, informs us that the most difficult detail, that of arranging the locking apparatus so as to make it adjustable to cars with sides of different heights, has been satisfactorily settled, and the permanent apparatus will soon be put in. The problem of holding the car to the rails is not so serious as that of supporting the load contained in the

and for bridge timbers. Some approximate figures, taken from the report of the U. S. Department of Agriculture, Forestry Division (Bulletin No. 9), show that with an average of 2,500 ties per mile, the 230,000 miles of track in the United States, including second, third, fourth and side tracks, represent a total of 575,000,000 ties in service. Renewals, at 75,000,000 ties per year, and new construction at 15,000,000 make up a yearly total of 90,000,000 ties, or 450,000,000 cu. ft. To this 60,000,000 cu. ft. must be added for bridges and trestle work, making the total annual consumption for railroad purposes more than 500,000,000 cu. ft. This requires the annual cutting of more than 10 per cent. of the present forest area of the United States for this one purpose alone.

The process of vulcanizing timber consists in exposing

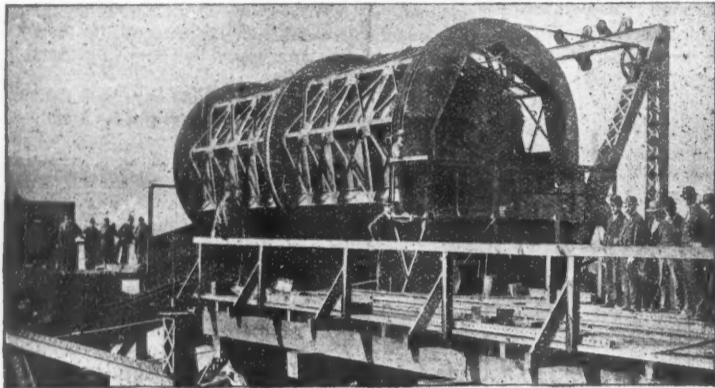


Fig. 2.

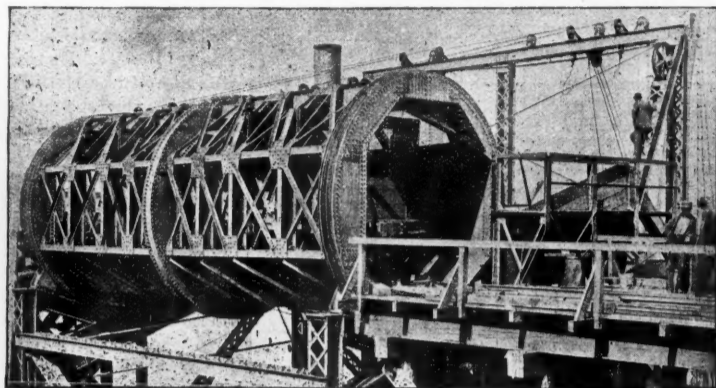


Fig. 1.

The Long Coal-Car Dumping Machine.

dock. The loaded car is run into this cylinder and made fast at the sides; the cylinder is then revolved sufficiently to tip the car to the degree shown in Figs. 2 and 4, and the coal falls out into the chute which conducts it to the vessel lying alongside the dock. The diameter of the cylinder is 16 ft. outside and 11 ft. inside, and it is 40 ft. long. The ways, at either end, on which it rests, are inclined, so that the cylinder when moved rolls upward (see Fig. 4). There are holes in the periphery of the cylinder at each end, and cone-shaped pins on the inclined ways, which serve to keep the two ends of the cylinder exactly in line on the ways. These pins, visible in Fig. 4, are 4 in. in diameter. The cylinder is moved by means of wire cables which run over pulleys, and are connected with the piston in a horizontal cylinder on the floor of the dock. This cylinder is 30 in. in diameter and 19 ft. 4 in. long, and is operated by steam

car while it is in the inclined position and before it has begun to spill out. To do this the sidewise pressure on the right hand side (see Fig. 1) must be ample and properly distributed. The saw-tooth arrangement shown in Fig. 5 was abandoned. The hydraulic pressure for the side bars will be taken from the city water mains, which give about 80 lbs. pressure per square inch.

The N. Y., P. & O. track is favorably situated at this place, the main line being on high ground some distance back from the dock. A short trestle was built from the tracks adjoining the main line and this trestle approaches the dumping machine from the left, as seen in Fig. 3. On the right the trestle descends to the ore dock, about 1,300 ft. distant, and the cars are run down grade to that dock to receive their return loads of ore.

The cost of the machine will be about \$15,000, and the railroad company has spent about \$30,000 in building the

it to heat, under pressure. The cause of decay in wood is the fermentation of the sap. To prevent this, the vulcanizing process destroys the raw albumen by coagulating it by heat, and it further causes the formation in the timber of a crude pyroligneous acid, which, being antiseptic, is preservative, and which is prevented from escaping from the pores of the wood by the pressure under which the process takes place. The heat also causes the melting and distribution throughout the timber of the solids contained in the wood cells, which, by afterwards solidifying, seal the pores of the wood against external influences.

There are still other effects upon the quality of the wood, however, than those just mentioned. Tests made at Stevens Institute, in 1884, by A. P. Trautwein, on sections of yellow pine plank, showed that the vulcanized pieces were so strengthened by the process that their

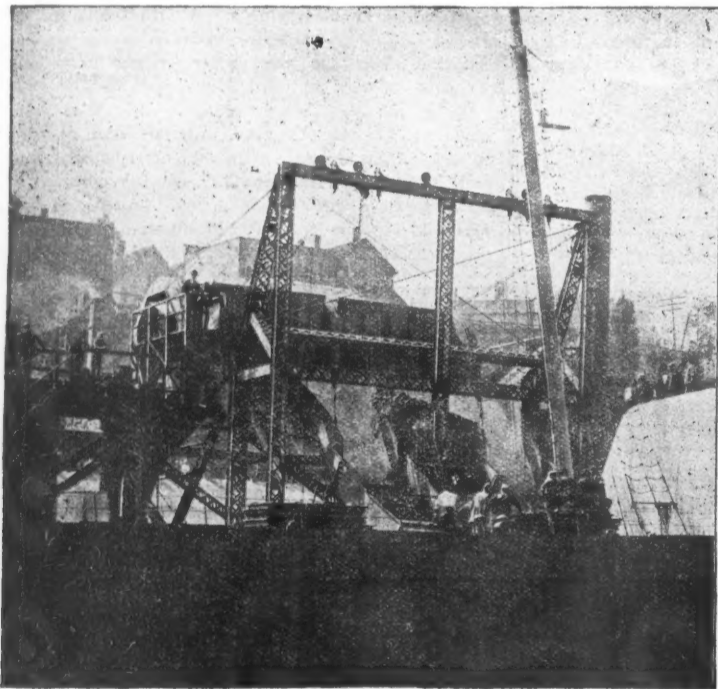


Fig. 3.

The Long Coal-Car Dumping Machine.

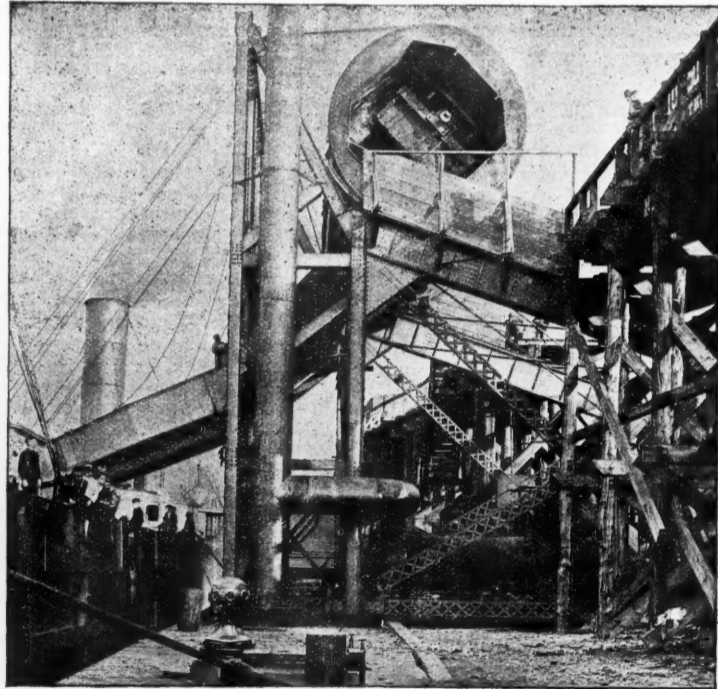


Fig. 4.

at a pressure of about 80 lbs. to the inch. A single stroke suffices to roll the car-cylinder up to the position shown in Figs. 2 and 4. The chute, as will be seen in Fig. 3, divides into two, so that coal can be poured into two hatchways at the same time. The lower and movable portions of these chutes, when adjusted to receive the coal from the car, are held in a nearly horizontal position, so that the coal will be broken as little as possible. Then while the car is being returned to the track the discharging ends of the chutes are lowered to a suitable angle to drop the coal into the vessel as gently as possible. Both chutes are moved and adjusted by means of a small engine on the floor of the dock, one man at the engine attending to both.

The clamp which holds the car in place in the cylinder

trestle, rebuilding a portion of the wharf and making other necessary improvements and alterations, including the foundation for the machine; but the cost of unloading coal by hand is something like 25 cents a ton, so that the machine will effect a saving equal to its entire cost in a very short time.

The Vulcanizing Process of Preserving Timber.

We have several times referred in these columns to the method of preserving wood by "vulcanizing" it, and the process was described at some length in our issue of Sept. 5, 1890. While a preservative for timber is useful in a great variety of work, its principal use will probably be in the preservation of railroad ties from decay

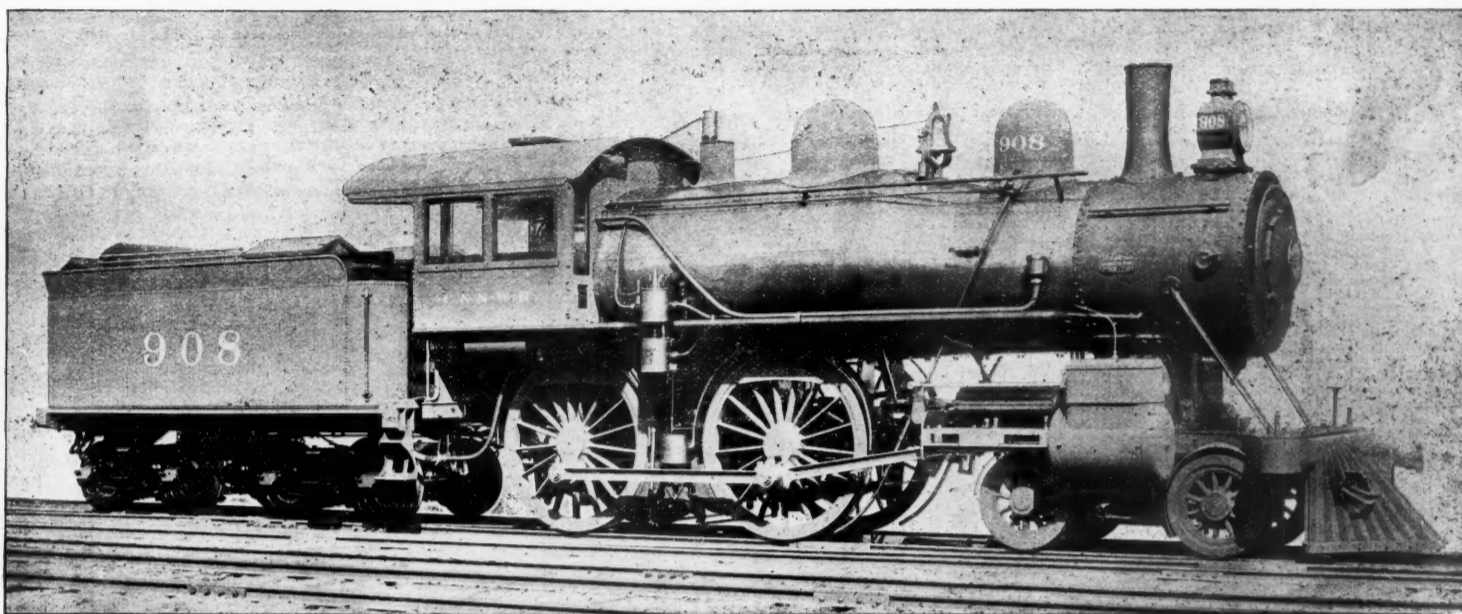
modulus of rupture by transverse stress was 21 per cent. higher, and the crushing strength, 23 per cent. higher. Tests by transverse stress, made by Prof. R. N. Thurston, showed a considerable increase in the breaking load and decrease in deflection. Dr. C. F. Chandler, of the Columbia School of Mines, made an analysis of samples of vulcanized wood in 1890, which showed a radical change in the character of the wood, in that, after treatment, it contained nearly 12 per cent. of preservative substances, most of which had resulted from the action of heat. Doctor Chandler terms the process "a remarkably simple and effective one for improving the appearance, and very greatly increasing the durability of timber, and protecting it from the agencies which result in destroying, by decay, timber which has not been treated." Similar

favorable results were obtained by a special committee, appointed by the Secretary of the Navy, to investigate the value of vulcanized timber for naval construction. Another quality of the wood which is improved by the process is its spike-holding power, due to the greater density of the wood after treatment.

These tests, however, are all laboratory tests, and do not carry with them the weight that service tests do.

same road it has been found that creosoting softens the wood and weakens its spike-holding qualities. They began the use of vulcanized wood in the spring of 1883. One million feet of vulcanized cross-ties and planking was placed on the road that year, expressly to give it a fair trial on its merits. After the lapse of six years a careful and critical examination was made of the vulcanized material laid in 1883, and it was found

cylinders, hot air is forced into them, under pressure, the temperature being raised to from 450 to 500 deg., while a pressure of from 140 to 150 lbs. per square inch is maintained. The process lasts about 8 hours and when completed the cylinders are gradually cooled and the timber withdrawn. The time for the process varies, however, depending somewhat upon the quality of the timber to be treated. It will naturally take longer to



Eight-Wheel Locomotive for Fast and Heavy Passenger Service.

Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, New York. For the CHICAGO & NORTHWESTERN RAILWAY.

Probably the best tests that vulcanized timber has had in service are furnished by its use on the Manhattan Elevated Railroad of New York. During two years, beginning March, 1891, 5,429,036 ft. B. M., of vulcanized timber, embracing ties, guard rail, and slatting, was used by this road. Col. F. K. Hain, Second Vice-President and General Manager of the road, says that he has found it of especial value in reducing the cost of painting the structure. Since the adoption of vulcanized timber the painting force has been reduced over one-half, it

entirely free from decay, and as sound and sweet as the day it was laid. There were no indications of decay at the end of the vulcanized planking, while the planks and cross-ties not treated, placed on the structure at the same time, were decayed at the ends and where they were nailed or bolted to the supporting timbers.

A large experimental lot of timber treated by the vulcanizing process has recently been ordered by the New York and Brooklyn bridge, and it has been successfully tried on a number of other roads. The process of vul-

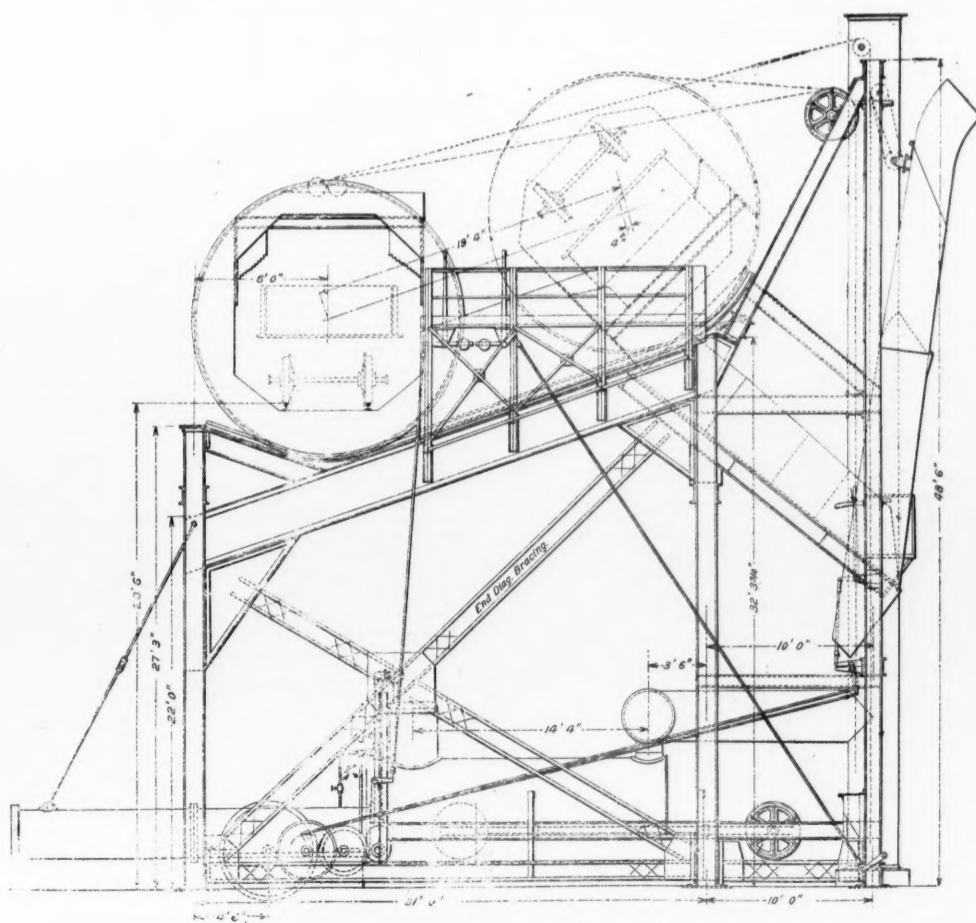
treat a hard than a soft wood, and the dryness of the wood also affects the duration of the treatment. The wood is divided into five grades, green, one-quarter dry, one-half dry, three-quarters dry, and dry. The process adds about 40 per cent. to the cost of a railroad tie, and varies from \$8 to \$10 per 1,000 ft. B. M., unless the wood is particularly hard, when the cost is somewhat greater.

The process is carried on at the works of the New York Wood Vulcanizing Company, of 2,915 Eighth avenue, New York City.

Schenectady Eight-Wheel Locomotives for the Chicago & Northwestern.

We show herewith, through the courtesy of Mr. A. J. Pitkin, Superintendent of the Schenectady Locomotive Works, an engraving from a photograph and description of one of the eight-wheel locomotives recently built by that company for the Chicago & Northwestern Railway for heavy passenger service. The engine is one of the twelve recently ordered from the Schenectady Locomotive Works. Five of these have now been delivered and are being used to haul trains No. 5 and 6 on the main line from Chicago to Council Bluffs. These trains are very heavy, sometimes consisting of as many as 11 cars, six of which are sleepers. While the average speed between terminals is not very fast, yet there are numerous stops, causing fast running between, making it an exceedingly hard service.

This locomotive is large and powerful, and is of neat design. The driving wheels are 75 in. in diameter, and the truck wheels are 36 in. The cylinders are 19 in. x 24 in., and the firebox is 8 ft. 0 ¹/₈ in. long. The diameter of the boiler at the first ring is 62 in. and the height of center of boiler above rails is 8 ft. 8 in. The diameter of the piston is 3 ¹/₄ in. except where it enters the crosshead, and there the diameter is increased to 3 ¹/₂ in. This was done to strengthen it at the point where the most frequent breakages have occurred. Cast iron gibs are used on the crosshead instead of brass ones. Cast steel is used in a great many places in order to get the necessary strength combined with lightness. The piston, crosshead, wheel centers, dome ring and deck plate are made of this material. The whistle is not put on the left hand side of the dome as is frequently done, but is located at the same place as the safety valve. By this arrangement not only is the dome given a more symmetrical appearance, but should it be necessary to remove the covering, the boiler need not be blown off, and the whistle removed. The truck wheels are braked and Leach's track sanding apparatus is used. The interior arrangement of the cab is neat, half of the back head of the boiler being lagged and covered with planished iron. This was done for the reason that the large heating surface which otherwise would be exposed, would make it unnecessarily hot for the fireman in warm weather. The location of the throttle and reverse levers and engineer's brake valve is convenient. At first sight the reverse lever seems short, but this is not really the case as the short length above the quadrant is due to the height of the running board. The top of the tank in the tender is made sloping in order that it shall not be necessary for the fireman to shovel down the coal that might lodge there. The numbers and lettering on this locomotive are of platinum



The Long, Coal-Car Dumping Machine, End View.

being no longer necessary to paint the woodwork, only the ironwork being painted. The average life of untreated ties on the road has been from five to six years, which shows that the service is a fairly severe one. The remarkable statement is made officially that since the adoption of vulcanized wood in 1883, the road has found it unnecessary to remove any of it, since an examination has shown it to be as sound as when first laid. On the

vulcanizing is very simple. The timber to be treated is run into large cylinders, about 8 ft. in diameter and 105 ft. long. The plant at New York city contains four of these cylinders giving a capacity of 180,000 ft. B. M. of timber per day. These cylinders are covered with an asbestos lagging, and each is provided with a pyrometer and two thermometers. A reading of these instruments is taken every 15 minutes. After the timber is placed in the

and make a handsome appearance on the black background. The following table gives the dimensions:

DIMENSIONS OF SCHENECTADY LOCOMOTIVE FOR THE CHICAGO & NORTHWESTERN.

Type.....	8-wheel passenger
Name or number.....	908
Name of builder.....	Schenectady Locomotive Works
Name of operating road.....	Chicago & Northwestern Railway
Gage.....	4 ft. 8 1/2 in.
Simple or compound.....	Simple
Kind of fuel to be used.....	Bituminous coal
Weight on drivers.....	78,000 lbs.
" truck wheels.....	47,600 lbs.
" total.....	125,600 lbs.
General Dimensions.	
Wheel base, total, of engine.....	23 ft. 7 in.
" " driving.....	8 ft. 6 in.
" " total (engine and tender).....	47 ft. 6 in.
Height, center of boiler above rails.....	8 ft. 8 in.
" of stack.....	14 ft. 11 in.
Heating surface, firebox.....	159.3 sq. ft.
" tubes.....	1,715.6 sq. ft.
" firebrick tubes.....	28.8 sq. ft.
" total.....	1,903.7 sq. ft.
Grate area.....	26.96 sq. ft.

Wheels and Journals.	
Drivers, number.....	Four
" diameter.....	75 in.
" material of centers.....	Cast steel
Truck wheels, diameter.....	33 in.
Journals, driving axle, size.....	8 in. dia. x 11 in. long
" " truck.....	6 in. dia. x 10 in. long
Main crank pin, size, main rod 5/8 in. x 5/8 in.; side rod, 1/2 in. dia. x 4 in. long.....	

Cylinders.	
Cylinders, diameter.....	19 in.
Piston, stroke.....	24 in.
" rod, diameter.....	3 3/4 in.
Kind of piston rod packing.....	Jerome metallic
Main rod, length center to center.....	7 ft. 7 1/4 in.
Steam ports, length.....	20 in.
" width.....	1 1/2 in.
Exhaust ports, length.....	20 in.
" width.....	3 in.
Bridge, width.....	1 1/2 in.

Valves.	
Valves, kind of.....	Allen-Richardson Balanced
" greatest travel.....	6 in.
" outside lap.....	1 1/4 in.
" inside clearance.....	3/8 in.
" lead.....	1/8 in. lap in full gear forward motion and back eccentric set to give 1/4 in. lead at 6 in. cut-off forward motion.

Boiler.	
Boiler, type of.....	Extended wagon top
" working steam pressure.....	190 lbs.
" material in barrel.....	Carbon steel
" thickness of material in barrel.....	3/8 in.
" diameter of barrel at first ring.....	66 in.
Seams, kind of horizontal.....	Multiple riveted, butt with welt inside and outside.
" " circumferential.....	Double riveted
Thickness of tube sheets.....	1/2 in.
" of crown sheet.....	3/8 in.
Crown sheet stayed with.....	Radial stays 1 in. diameter
Dome, diameter.....	30 in.

Tubes.	
Tubes, number.....	287
" material.....	Syracuse Iron No. 11
" outside diameter.....	2 in.
" length over sheets.....	11 ft. 6 in.

Firebox.	
Firebox, length.....	8 ft. 3/4 in.
" width.....	3 ft. 4 1/2 in.
" depth front.....	7 1/4 in.
" " back.....	6 3/4 in.
" material.....	Schoenberger steel
" thickness of sheets.....	Back and sides, 5/8 in.
" brick arch? Yes.....	Supported on 13 in. tubes
" water space, width.....	Front, 4 1/2 to 5 in.; sides, 4 to 4 1/2 in.; back, 4 in.
Grate, kind of.....	Rocking, with drop plate

Smokebox.	
Smokebox, diameter outside.....	65 in.
" length from flue sheet.....	66 1/4 in.

Other Parts.	
Exhaust nozzle, single or double.....	Single
" " permanent.....	
" " diameter.....	1 1/2 in. 5 in. and 3 1/2 in.
" " distance of tip below center of boiler.....	1 1/2 in.
Netting, wire or plate.....	Perforated plate
" size of perforation.....	1 1/4 in. x 3/8 in.
Stack, straight or taper.....	Cast iron, taper
" least diameter.....	Near bottom, 14 in.
" greatest diameter.....	At top, 16 1/2 in.
" height above smokebox.....	3 ft. 6 1/2 in.

Street Railroad Transfers in Brooklyn.

Since the election of Mr. Clinton L. Rossiter as president of the Brooklyn Heights street railroad system of Brooklyn, N. Y., many improvements have been made for the convenience and comfort of the public; but the first and most important was the introduction of an extensive transfer system. Since July first 16 new points of transfer have been established, and the company is now issuing over 60,000 transfer tickets a day on all of its lines. A person can board a car at Fulton Ferry, ride around all day and return to the starting point for one fare of five cents if he is skillful in using the transfers.

The accompanying map shows the lines operated by the Brooklyn Heights system, together with the points of transfer. The routes and transfers are:

Fulton street line: From Fulton Ferry along Fulton street to Broadway, East New York. Transfers: To new Crosstown-Meeker avenue, Court street and Montague street lines at City Hall square; old Crosstown line at Willoughby street; Nostrand avenue and Lorimer street lines at Nostrand avenue; to Tompkins avenue line at Tompkins avenue.

Putnam avenue and Halsey street line: From Fulton Ferry through Fulton street to Putnam avenue to Nostrand avenue to Halsey street to Broadway. Transfers: To Court street, Montague street and new Crosstown-Meeker avenue lines at City Hall square; old Crosstown line at Fulton and Willoughby streets; Nostrand avenue and Lorimer street lines at Halsey street and Nostrand avenue (also at Putnam and Nostrand avenues), and to Tompkins avenue line at Halsey street and Tompkins avenue.

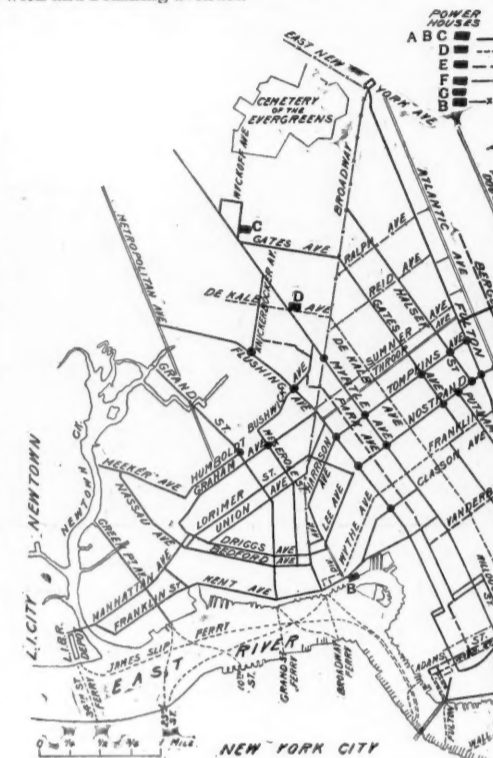
Gates avenue line: From Fulton Ferry, through Fulton street to Greene, to Franklin, to Gates avenues, to Myrtle avenue, Ridgewood. Transfers: To Court street, Montague street and new Crosstown-Meeker avenue lines at City Hall square; old Crosstown line at Willoughby and Fulton streets; Nostrand avenue and Lorimer street lines at Nostrand and Gates avenues; and Tompkins avenue line at Tompkins and Gates avenues.

Myrtle avenue line: From Fulton Ferry, through Fulton street, to Myrtle avenue, to Ridgewood. Trans-

fers: To Court and Montague streets lines at City Hall square; Nostrand avenue and Lorimer street lines at Myrtle and Nostrand avenues; Tompkins avenue line at Tompkins and Myrtle avenues and to the Reid, Ralph, Broadway and Jamaica lines of the Brooklyn, Queens County & Suburban electric railroad at Broadway.

Union avenue line: From Ridgewood through Myrtle, Knickerbocker, Flushing, Troop and Union avenues to Greenpoint ferries. Transfers: To Flushing avenue line at Flushing and Knickerbocker avenues; Bushwick avenue line at Bushwick and Flushing avenues.

Bushwick avenue line: From Grand street ferry, foot of Grand street, to Kent avenue, to Broadway, to Bedford avenue, to South Fourth street, to Meserole street, to Bushwick avenue, to Myrtle avenue, to city line. Transfers: To new Crosstown-Meeker avenue and Graham avenue branch of Flushing avenue line at Graham avenue and Meserole street; Union avenue line at Bushwick and Flushing avenues.



The Trolley Lines of Brooklyn.

Parallelograms Show Power Houses; Circles Show Transfer Points.

New Crosstown-Meeker avenue line: From City Hall (Myrtle avenue and Washington street) through Myrtle, Washington, Flushing, Graham, Grand, Humboldt, and Meeker avenues to Newtown Creek. Transfers: To Montague street, Gates avenue, Putnam avenue and Halsey street, Fulton street, Flatbush avenue, Third avenue and Court street lines at City Hall; Nostrand avenue and Lorimer street lines at Nostrand and Flushing avenues; Tompkins avenue line at Tompkins and Flushing avenues; Bushwick avenue line at Meserole street and Graham avenue; Grand street line at Humboldt and Grand streets.

Old Crosstown line: From Erie Basin, via Richards, Woodhull and Columbia streets, to Atlantic avenue, through Court, Joralemon, Willoughby and Raymond streets to Park avenue, to Washington avenue, to Kent avenue, to Broadway (passing Grand and Roosevelt street ferries), through Driggs, Van Cott and Manhattan avenues to and across Newton Creek, to Long Island City, through Vernon and Borden avenues to Thirty-fourth street ferry and Long Island Railroad depot, Long Island City. In returning, the same route is followed, excepting Driggs avenue and Raymond street. Instead of these the cars pass through Bedford avenue and Navy street. Some of the cars on this line run only between the City Hall (Joralemon and Court streets) and Long Island City, instead of from Erie Basin. Transfers: To Hamilton avenue line at Richards street and Hamilton avenue (or at Columbia street and Hamilton avenue); Furman street line, at Atlantic avenue and Columbia street; Court street line, at Joralemon and Court streets (or at Atlantic avenue and Court street), and to all lines up and down Fulton street at junction of Willoughby and Fulton streets.

Greenpoint line: From City Hall, through Myrtle avenue, to Classon avenue, to Kent avenue, to Franklin street, to Commercial street, to Newtown Creek. Transfers: To Court street and Montague street lines at City Hall square, to Flushing avenue line at Flushing and Classon avenues.

Flushing avenue line: From Fulton ferry, through Fulton to Sands street to Hudson avenue to Flushing avenue, to Broadway and Graham avenue and along Graham, Van Cott, Manhattan and Greenpoint avenues to Twenty-third and Tenth street ferries, Greenpoint. A branch line, known as the Flushing Avenue Extension, has just been opened, starting from the Brooklyn Bridge at Sands and Fulton streets and running through Sands street and Hudson and Flushing avenues to the Bushwick crossing of the Long Island Railroad near Metropolitan avenue. Transfers: To Greenpoint line at Classon and Flushing avenues; Nostrand avenue line at Flushing and Nostrand avenues; Tompkins avenue line, at Flushing and Tompkins avenue; Union avenue line at Knickerbocker and Flushing avenues; Bushwick avenue line, at Graham avenue and Meserole street.

Lorimer street line: From Nostrand and Atlantic avenues through Nostrand avenue to Gwinnett street, to Lorimer street, through Nassau, Manhattan and Greenpoint avenues, to 10th and 23d street ferries; returning via Greenpoint avenue, Franklin street and Meserole avenue to Manhattan avenue. Transfers: To new Crosstown-Meeker avenue line at Flushing and Nostrand avenues; to Nostrand avenue line at Atlantic and Nostrand avenues, for cars going to Prospect Park, and to the following lines at the intersection of those lines with Nostrand avenue, namely: Myrtle, Gates and Putnam avenues and Halsey, Fulton and Malbone streets.

Tompkins avenue line: From Douglas street and Kingston avenue along Kingston to Fulton street, to

Tompkins avenue; also from Atlantic and Nostrand avenues, along Nostrand to Fulton street, to Tompkins avenue, to Harrison avenue, to Division avenue, to Roebeling street, to Broadway. Transfers: To Fulton street line at Tompkins avenue and Fulton street; to Halsey street line at Halsey street and Tompkins avenue; to Gates avenue line at Gates and Tompkins avenues; to Myrtle avenue line at Myrtle and Tompkins avenues; to new Crosstown-Meeker and Flushing avenue lines at Tompkins and Flushing avenues. On Saturdays, Sundays and holidays, Tompkins avenue cars run through to Prospect Park. On such days transfers are issued at Nostrand avenue and Malbone street to the Holy Cross and Nostrand avenue extension line. When cars do not run through to Prospect Park, transfers are issued to the Nostrand avenue line at Atlantic and Nostrand avenues.

Nostrand avenue line: From Broadway and Kent avenue to Driggs avenue, to Division, to Lee, to Nostrand

avenues, to Malbone street, to Prospect Park. Transfers: To Flushing and new Crosstown-Meeker avenue lines at Flushing and Nostrand avenues; Myrtle avenue line at Myrtle and Nostrand avenues; Gates avenue line at Gates and Nostrand avenues; Halsey street line at Halsey street (or Putnam avenue) and Nostrand avenue; Fulton street line at Fulton street and Nostrand avenue; to Holy Cross and Nostrand avenue extension line, Nostrand avenue and Malbone street; to Lorimer street line at Atlantic and Nostrand avenues.

Holy Cross and Nostrand avenue extension line: From Flatbush avenue and Malbone street through Malbone street, to Nostrand avenue, to Vernon avenue, to Holy Cross cemetery, or to the end of Nostrand avenue at Flatbush avenue. Transfers: To the Nostrand avenue, Lorimer street and Tompkins avenue lines at Nostrand avenue and Malbone street.

Flatbush avenue line: From Fulton ferry through Fulton street to Flatbush avenue, to Prospect Park, Flatbush and Flatlands. Transfers: To Court street, Montague street and new Crosstown-Meeker avenue lines at City Hall square; old Crosstown line at Joralemon and Court streets; to Hamilton avenue line at Hamilton avenue and Court street.

Hamilton avenue line: From Hamilton ferry through Hamilton avenue, to Third avenue to Twenty-fifth street, to Fifth avenue (Greenwood cemetery), and through Third avenue to Sixty-fifth street. Transfers: To Court street line at Hamilton avenue and Court street; old Crosstown line at Richards street and Hamilton avenue (or at Columbia street and Hamilton avenue).

Second avenue line: From Thirty-ninth street ferry, Thirty-ninth street and Second avenue, through Second avenue, Sixty-fifth street, Third, Bay Ridge and Thirteenth avenues, Eighty-sixth street and Twenty-fifth avenue, to Unionville (Umler Park). Transfers: To Third avenue line at Sixty-fifth street and Third avenue for Fort Hamilton.

Furman street line: From Fulton ferry along Furman street to Atlantic avenue. Transfers: To old Crosstown line at Atlantic avenue and Columbia street.

Montague street cable line: From Montague and Court streets through Montague street to ferry at foot. Transfers: To Greenpoint, Myrtle avenue, Gates avenue, Putnam avenue, Fulton street, Flatbush avenue, Third avenue, Court street, and new Crosstown-Meeker avenue lines at City Hall square.

The points of transfer referred to as City Hall square are made at Willoughby and Fulton, Court and Joralemon, Court and Montague streets or Myrtle avenue and Washington street.

In addition to the routes above described the company is considering the advisability of running through cars from the bridge and ferry up Fulton street and Putnam

avenue, and through Nostrand avenue to Malbone street and Flatbush avenue. This will avoid the transfers at the corner of Putnam and Nostrand avenues and at Fulton street and Nostrand avenue, and make waiting for cars on street corners unnecessary.

Nearly all the lines center at Fulton Ferry, making the traffic on lower Fulton street, especially between City Hall and the ferry, very heavy and consequently slow. Several schemes have been tried to relieve this strain, but as yet the problem is unsolved. At present many of the cars are run only as far as the Brooklyn bridge at Sands and Fulton streets. This of course partially prevents overcrowding at the ferry where the direction of the cars has to be reversed owing to the lack of room to build a loop. During the past week the officials of the Brooklyn Heights road have asked permission to connect the tracks around City Hall square, thus making a loop whereby perhaps one third of the cars could be sent back to their starting points without running to either the bridge or ferry. In the opinion of the officers of the company this connection of tracks around the City Hall will take off about 1,000 cars a day from lower Fulton street, and will greatly accommodate

buys its power from the Kent avenue plant of the Brooklyn Heights.

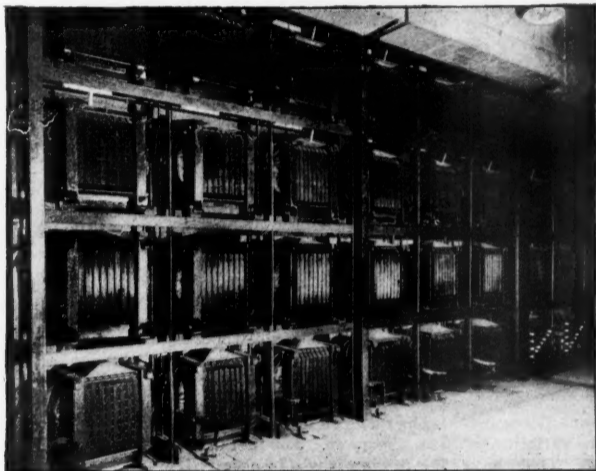
The Brooklyn Heights railroad is the lessee of the Brooklyn City road, and in turn is controlled by the Long Island Traction Co. The total amount (single track) of road operated is 199.1 miles electric and 1.2 miles cable. The following are now the officers: President, Clinton L. Rossiter; Secretary and Treasurer, T. S. Williams; Superintendent, Ira A. McCormack; Purchasing Agent, Sheldon T. Bent, and Chief Engineer, M. G. Starrett.

Long Distance Transmission at Portland, Oregon.

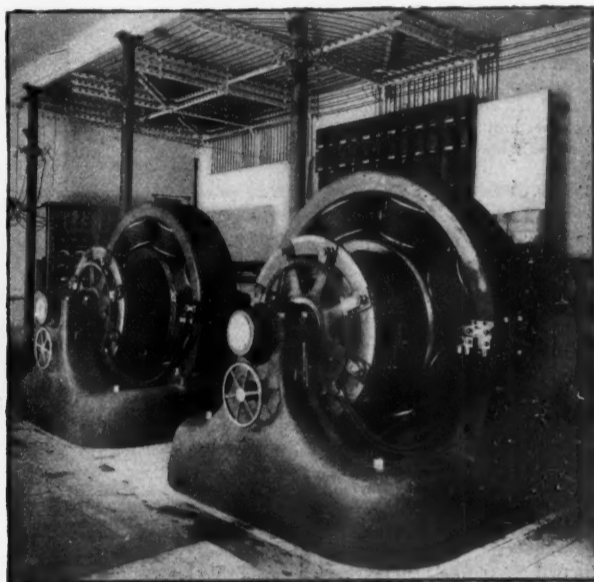
The work of utilizing the water powers of the far west is going on rapidly. Within the past month two electrical plants for the transmission of power from water falls over long distances have been installed, at Sacramento, Cal., 25 miles, and at Portland, Or., 14 miles. That at Portland presented many new electrical problems. The installation was made by the Portland General Electric

three units, each consisting of a pair of vertical, cylinder gate, improved Victor turbines, 42 in. and 60 in. in diameter respectively. The larger wheel is an auxiliary to be brought into service only at periods of excessive high water, which the records show occur about once in every five years. The smaller wheel runs at 200 revolutions, and the larger at 100 revolutions per minute. Both are set at the same level and each carries a pulley on its shaft; that of the 42-in. wheel being fixed to the generator shaft. When the large wheel is in operation the two pulleys are belted together, the smaller wheel is disconnected and the large wheel drives the generator at a uniform speed of 200 revolutions. When the smaller turbine is operated alone the belt lies upon a shelf surrounding the pulleys.

The weight of the vertical shaft with the armature is about 33,500 lbs. and to carry this a system of extra



Reducing Transformers—Portland Installation.



Rotary Converters—Portland Installation.

the demand for suitable car service in the great shopping district above the City Hall, especially during mid-day and again at night when the shops close and the thousands of employees attempt to take cars which they now find overcrowded with passengers from the ferry and bridge.

Instead of agents two forms of Stedman transfer tickets are used: one for the electric and one for the cable lines. The first transfer point was located at Classon and Flushing avenues in 1867, and this was the only one in exist-

Company, of which Mr. P. F. Morey is President. The company owns the entire water power of the falls on the Willamette River at Oregon City, 12 miles above Portland, which, with a head of 40 ft. has an estimated capacity of 50,000 H. P. Part of this power has already been utilized by numerous factories and mills, and by an electric station erected some years ago which supplied current for lighting the streets and dwellings of Portland and for operating an electric street railway between Oregon City and Milwaukee, seven miles away the direct

bearings is introduced, one of the ring thrust type and the other a hydraulic oil bearing, both supplementing the ring bearings on the armature shaft. They are enclosed in cases filled with oil delivered by hydraulic pressure, and are surrounded by water jackets.

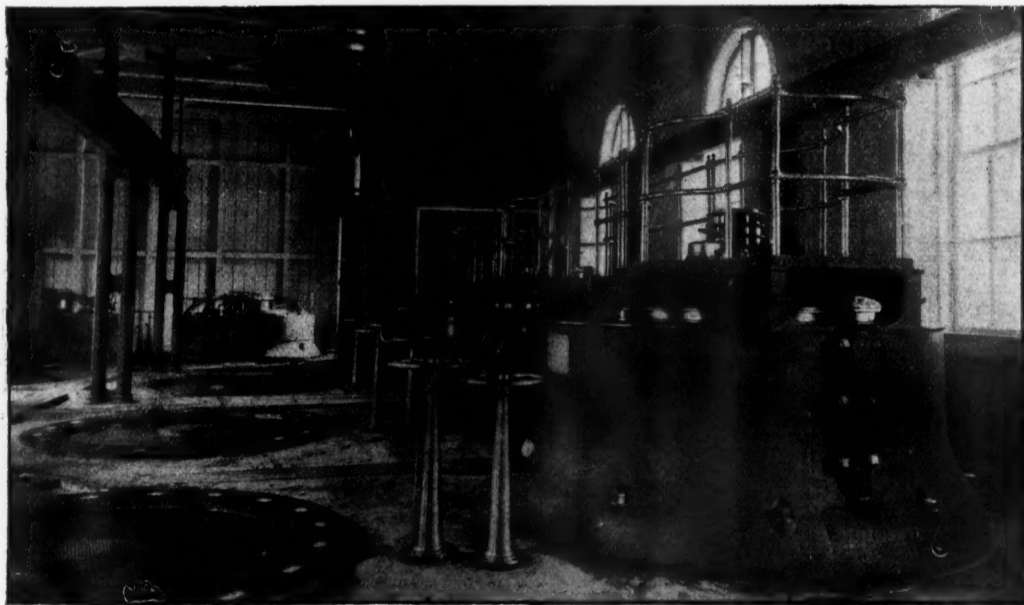
The length of the generator shaft is 20 ft., and it is 8½ in. in diameter. It is not a continuation of the shaft of the wheel but is coupled to it by means of a disc coupling, which allows of a certain free movement up and down of the generator shaft. Both wheels in each section are controlled by hand wheels and are regulated by the same governor. The belt tightener is also controlled from either floor by a hand wheel.

The water is admitted to the penstocks from the upper canal by means of a head gate operated from a platform on the canal side of the station. Each penstock is 10 ft. in diameter of steel. Each wheel has its own flume, the water passing first through the large flume of the larger wheel to the flume of the smaller wheel whence it passes into the tail race. In addition to this turbine equipment, an auxiliary power equipment has been furnished, consisting of a set of pumps, including a hydraulic pump for supplying oil to the thrust-bearing cylinders and a duplex water pump to circulate the water in the cylinder water jackets. They are operated by two 15-in. horizontal turbines inclosed in the same flume. For the operation of the exciters a further pair of vertical turbines has been installed, each 48 in. in diameter, driving generators by a system similar to that of the main machines.

The complete power plant will consist of 20 three-phase generators and two direct current generators, acting as exciters. The total capacity of the station will be 12,800 H. P., divided into 20 units, each one independent of the other. The completion of the entire plant is a matter of the future.

The three-phase system is used in this installation. A feature of the latter is the employment of large blocks of power for street railroad service, involving the transformation of the polyphase current sent over the line into direct current for railroad circuits. The frequency is 33 cycles per second, selected on account of the large amount of power which it was necessary to convert from alternating into direct current. The current is delivered directly to the line from the generators and when it reaches Portland is transformed down to a potential of 400 volts. For the power service the step-down transformers are connected to rotary converters which will deliver a continuous current of 500 volts for street railroad service, as well as for the operation of stationary motors. Induction motors will also be used directly connected to the secondaries of the step-down transformers when this can be done to advantage.

The five sections of the building already erected are occupied as follows. The first contains the pumps and the accumulators for the complete station; in each of the three following sections is one three-phase alternating current generator of 450 kw. or 600 H. P. capacity and the fifth section contains two 250 kw. M. P. continuous current generators used as exciters. These have



Interior of Station, Showing Three 3-Phase Generators and Two Direct-Current Exciters—Portland Installation.

tance until 1888, when the junction of Graham and Flushing avenues was made a changing point.

Brooklyn was one of the first cities to adopt extensively the overhead trolley. Permission was first given for the use of this system by the Common Council of the city on January 11, 1892. The Board of State Railroad Commissioners (who had considered the matter on Nov. 17, 1890), confirmed the action on Jan. 26, 1892. The Brooklyn City, now the Brooklyn Heights road at once began construction work, and on May 22, 1892, ran the first trolley car over its Second avenue line. Four more lines were opened in 1892, nine in 1893, 12 in 1894, and the balance early in 1895.

The Brooklyn Heights road has three power stations, one at Fifty-second street and First avenue, the second at Kent and Division avenues, and the third at Ridgewood. The Brooklyn, Queens County & Suburban road

current and high frequency alternating systems being used.

The plant of the Portland General Electric Company is on the west side of the Willamette River opposite the city of Oregon. The building is being put up in 20 sections, of which five are already built and foundations are now being laid for the remainder. The ultimate generating capacity of the station will be 12,800 H. P. The company owns considerable land in the vicinity of the station, and controls the canal which allows vessels to pass the falls, and for the construction of which the state contributed \$200,000, the company supplying the remainder.

The station is of concrete, stone, iron and brick and when finished will be 364 ft. long. The water wheel plant is from the works of the Stillwell-Bierce and Smith-Vaile Co., of Dayton, O., and consists at present of

armatures revolving horizontally with one bearing at floor line. Each exciter is capable of exciting all of the 20 three-phase generators, the second being a reserve. At present one is furnishing direct current to the street railroads in Oregon City. When the station is complete, the exciter section will be removed from the fifth section, which it now occupies, and will be placed in the center section of the building, where the switchboards will also be erected.

The generators are of special design, and are set on the floor of the station, the armatures revolving in a horizontal plane, with one bearing at the floor line and another on top of the armature underneath the collector rings. Each generator has 20 laminated poles. The armatures are a little over 7 ft. in diameter, and are about 2 ft. high. They deliver current directly to the line at a working potential of 6,000 volts, effective pressure, without the use of step-up transformers. This high voltage made unusual precautions necessary in the installation of the armature coils. The armatures are wound with flat wire, and each of the coils is divided into separately insulated sections. As a test, the armatures were subjected to a pressure of 15,000 volts alternating and were both short circuited and open circuited under full excitation, without the slightest injury.

The field coils are wound for excitation of 500 volts, continuous current, and each has been subjected to a test of 5,000 volts, alternating. The regulation in these machines has proved very good, the increase from no load to full load being comparatively moderate.

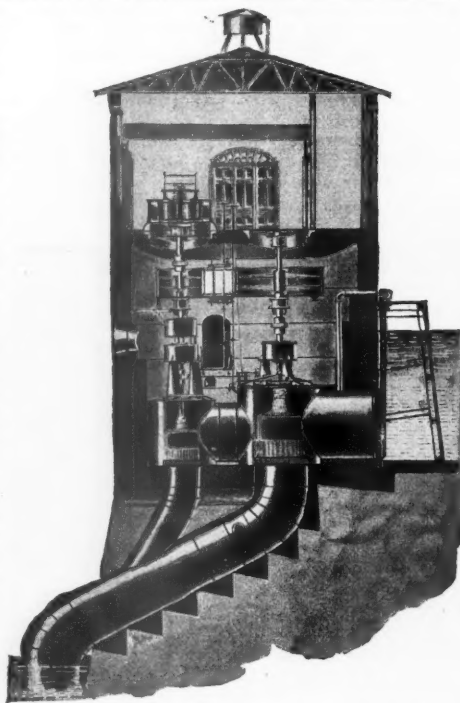
The high tension switchboards are built of marble. Each panel carries a double pole main switch for the high potential circuit and a double pole double throw switch for the exciting circuits. It also carries a rheostat for the control of the excitation of each machine and a single throw switch opening the circuit through a set of seven 32 C. P. 110 volts. In addition the board carries a current indicator for each line and one for the exciting circuit, and a potential indicator with station transformer placed at the back. The upper part of each panel consists of a set of plug connections for coupling the machines in parallel or for direct line connections from each generator.

The exciter switchboard consists of two panels with a special switching panel between them. By means of this panel current for the railroad service in Oregon City can be obtained from either exciter, or the two exciters can be coupled in parallel or the outgoing railroad current can be used for excitation purposes and the balance from the exciters can be used for other work.

The line is 14.3 miles long, a separate circuit being installed for each machine. It passes through an undulating country, and follows the course of the Willamette River. The poles also carry a number of wires for the 5,000 volt continuous current from the old transmission station, as well as the wires for the old system of lighting with high frequency 5,000 volt alternating current. The loss in the long distance transmission line is calculated at full load at about 11 per cent.

The sub-station at Portland is a two-story building 40

and high voltages, however, on it is desirable to have a large number of transformers banked. The bank, therefore, is divided into three sets instead of two so that each group may act as a reserve to the other two sides, enabling two-thirds of the power of each generator to be delivered even if the transformers on one leg of the circuit have to be disconnected, nor is the balance of the



Section Through Station—Portland Installation.

system effected by this change of connection. The transformers regulate at a little over 1 per cent. variation of the secondaries from no load to full load. They have air passages between successive bunches of iron laminae and between the coils so that they may be cooled by artificial ventilation.

The distribution of light from the secondaries is effected on the Edison four wire system worked at 1,000 volts between wires, a variation of 4 per cent. in either direction being covered by means of feeder regulators.

At present the lighting from the three-phase system is used for large buildings, close to the city station. For outlying districts the high frequency apparatus with individual transformers will still be employed. Continuous current will be furnished to the railroad and to the stationary motors already installed, but new motor installations will be made with the three-phase motors

and passing through a rotary converter, be transmitted at 600 volts continuous eight miles to Milwaukee and connect with the continuous current from Oregon City.

This plant, when the full power of 12,800 H. P. is utilized, will be one of the largest long-distance transmission plants in the world. Its satisfactory operation, so far, shows the effectiveness of the three-phase transmission system for general service. The generators and other electric apparatus used are all of the General Electric Company's make.

Rogers Compounds for Chili.

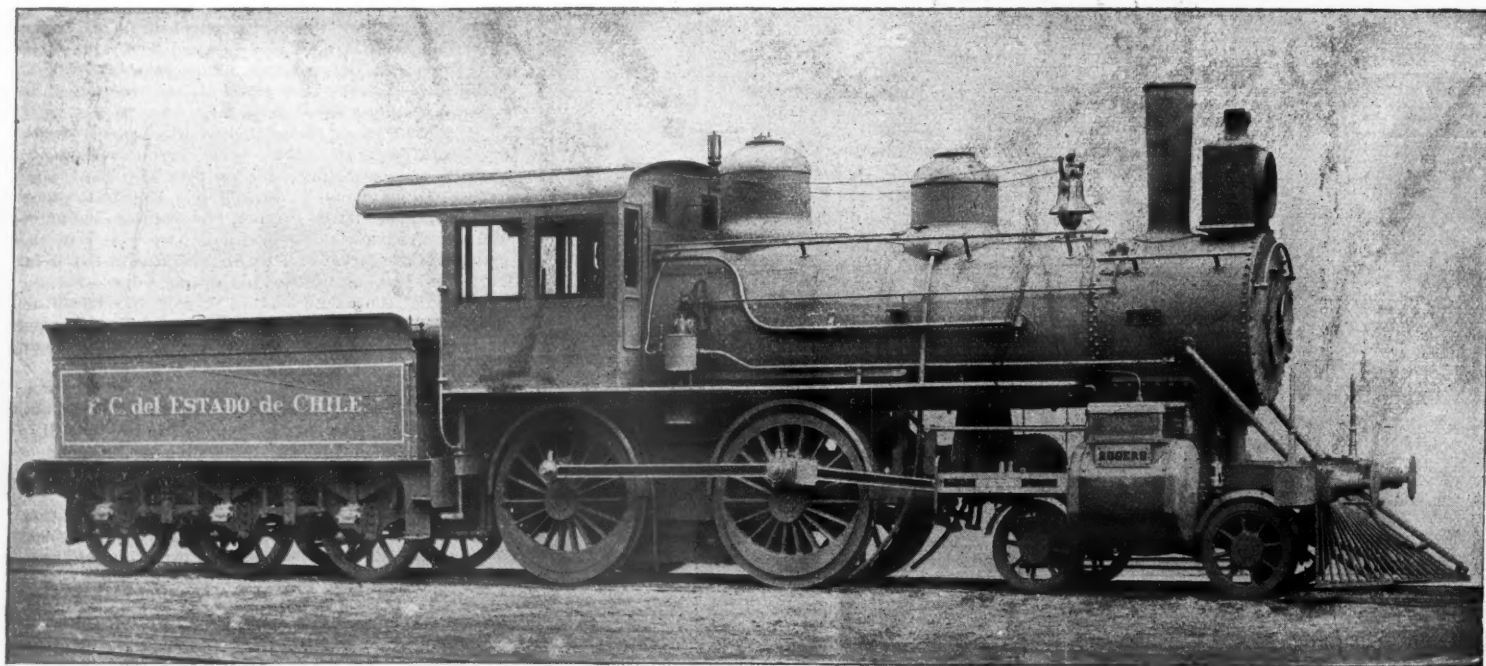
We described in the *Railroad Gazette* for March 17, 1893, a two-cylinder compound locomotive of the mogul type built for the Illinois Central Railroad after the designs of Mr. Reuben Wells, Superintendent of the Rogers Locomotive and Machine Works. This was the first compound built by the Rogers works, and details of the compounding system are shown in the article referred to. Since building this locomotive some modifications and improvements have been made in the system of compounding, which we hope to fully illustrate in a future issue. The Rogers compound differs from the simple type only in the matter of intercepting valve, cylinders and link motion. The system of compounding is fully described and illustrated in the article concerning the Illinois Central locomotives, mentioned above.

Four two-cylinder compound passenger engines of the improved type have recently been built by the Rogers company for use upon the State railroads of Chili. One of these engines is illustrated in the accompanying engraving, which shows an eight-wheel engine, of which two were built. There were also two 10 wheel engines of the same finish, the same kind of materials, size drivers, truck wheels, tenders, etc., being used. Their cylinders, however, were 1 in. larger; that is, the high-pressure cylinders were 20 in. and the low-pressure $20\frac{1}{2} \times 24$ in. stroke. Their boilers are also in heating surface, grate area, weight and size about 10 per cent. larger than those used on the eight-wheel engines. The compounding arrangement is the same. The pistons in all of these engines are of the kind described and illustrated in the *Railroad Gazette* for Sept. 13, 1895.

The roads on which these engines are to be used are of 5 ft. 6 in. gage. The fuel used will be bituminous coal. The tender, it will be observed, is not American. It has slab frames and six wheels. The design was furnished from Chili. Its capacity is 5 tons of coal and 3,000 gals. of water. The Westinghouse air-brake is used, and a $9\frac{1}{2}$ -in. brake pump is provided. The cab, as the illustration shows, is made of steel, with an inside wooden ceiling.

The general dimensions of the eight-wheel engines are as follows:

Description.	
Gage.....	5 ft. 6 in.
Fuel.....	Bituminous coal
Weight on drivers.....	72,000 lbs.
Weight on truck wheels.....	45,000 lbs.
Weight, total.....	117,000 lbs.
Wheel base, total.....	22 ft. 11 in.
Wheel base, driving.....	8 ft. 3 in.
Height, center of boiler above rails.....	8 ft. $\frac{1}{2}$ in.
Height of stack above rails.....	15 ft. 0 in.



Rogers Compound Passenger Locomotive for the State Railroads of Chili.

$\times 100$ ft. The lower floor contains the transformers, the rotary converters, repair shop, lamp and meter-room. The upper story of the building is occupied by the offices.

In the transformation room at present are the necessary transformers for the three units already installed—45 in all. The receiving end of each line is connected to a bank of 15 transformers per generator, five being placed between each pair of wires of the three-phase system. Each set of five transformers is connected to the primaries in series and to the secondaries in parallel, although in the transformation of the three phase current two sets only are necessary; For such large units

which will be run straight from the three-phase switchboard in parallel with the rotary transformer. The direct railroad current will be carried to the East Side Railway station by means of cables under the Willamette River, and this distribution will reach as far as Milwaukee, where connection will be made in parallel with the 600 volt service from either station A or station B, at Oregon City. The loop from Oregon City to Portland and back will thus be as follows: Beginning at Oregon City with 33 cycle three-phase current at 6,000 volts, 14.3 miles will be traversed as far as Portland; the current will then be transformed to 400 volts alternating

Heating surface, firebox.....	140 sq. ft.
Heating surface, tubes.....	1,198 sq. ft.
Heating surface, total.....	1,338 sq. ft.
Grate area.....	20 sq. ft.

Wheels and Journals.

Drivers, number (wrought iron centers).....	4
diameter, outside of tires.....	68 in.
Truck wheels, kind, wrought iron, spoke center, steel tired, diameter.....	33 in.
Journals, driving axle, size.....	8 \times 10 in.
truck axle.....	5 $\frac{1}{2}$ \times 12 in.
Axles, driving material.....	hammered iron
truck.....	

Cylinders.

Cylinders, diameter.....	H. P., 19 in.; L. P., $28\frac{1}{4}$ in.
Piston, stroke.....	24 in.

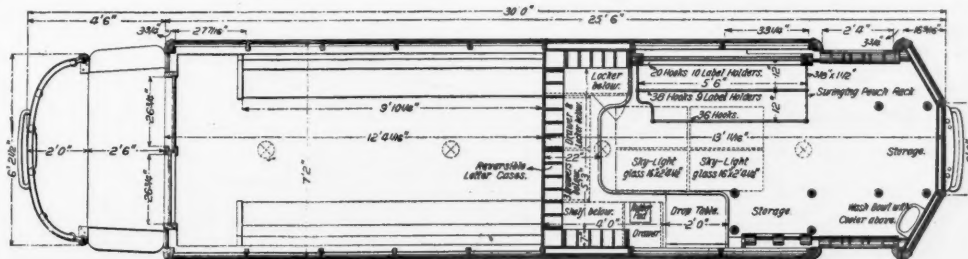
Piston rod, diameter.....	3¼ in.
Kind of piston-rod packing.....	Jerome metallic
Main rod, length, center to center.....	7 ft. 5 in.
Steam ports, length.....	H. P., 22 in.; L. P., 29 in.
width, both cylinders.....	19½ in.
Exhaust ports, length.....	H. P., 22 in.; L. P., 29 in.
width, both cylinders.....	3¼ in.
Bridge, width.....	19½ in.
Exhaust pipe.....	single
Valves.	
Valves, kind of.....	Richardson's balanced
greatest travel.....	6 in.
on side lap.....	H. P., 1¼ in.; L. P., 1½ in.
inside lap or clearance.....	H. P., ¼ in. each side;
L. P., ½ in. each side.	
lead in full gear.....	H. P., ¾ in.; L. P., 1 in.
Boiler.	
Boiler, type of.....	extended wagon top
working steam pressure.....	180 lbs.
material in barrel.....	steel
thickness of material in barrel.....	¾ and 5/8 in.
diameter of barrel outside at first course.....	88 in.
Seams, kind of.....	Sextuple riveted, butt
circumferential.....	double riveted, lap
Crown sheet stayed with.....	crow bars
Dome, diameter.....	30 in.
Tubes.	
Tubes, number.....	278
material.....	brass
outside diameter.....	2 in.
length over sheets.....	11 ft. 0 in.
Firebox.	
Firebox, length.....	5 ft. 6 in.
width.....	3 ft. 6 in.
depth front.....	87½ in.
back.....	88½ in.
material.....	copper
thickness of sheets.....	¾ in. 6/8 in. tube sheet
brick arch.....	supported on studs
Graze, kind of.....	cast-iron bars, stationary
Tender.	
Tank capacity.....	3,000 gals.
Coal.....	5 tons.
Frame of steel slabs.....	"European" type
Wheels, kind.....	Wrought iron spoke center, steel tired
diameter.....	48½ in.
Axle, material.....	hammered iron
Journals, size.....	5 x 8 in.
Water supply led to boiler by.....	No. 9 Monitor injector
Cylinders oiled by.....	No. 9 Nathan triple feed lubricator

Street Railroad Postal Cars.

We illustrate herewith a combination passenger and mail car, made by the Pullman Palace Car Co., for use upon street railroads in Chicago and another for New York. As will be seen from the engraving the car is 30 ft. long, about 14 ft. of which is used for the railroad post-office, leaving about 12 ft. for the seating of passengers, and 4 ft. 6 in. for a platform. The seats in the passenger-carrying part of the car run along its sides leaving a center aisle. The seats provide room for from 10 to 12 persons. The postal compartment is provided with a large skylight, and has two windows and a door with a window in the upper part on each side, insuring plenty of light. Ample provision is made for the comfort of the postal clerks. A drop box for letters is provided on one side of the car. These cars resemble the regular passenger cars externally, with the exception that there is a platform and hood at one end only.

The carrying of mail by the street railroad lines has become a matter of considerable importance in a number of our larger cities. In St. Louis, Boston, Chicago, Brooklyn and elsewhere this is done, and, judging from the experience of Mr. Benj. Norton, as given in our recent report of the meeting of the New York Street Railway Association, the mail carrying contracts are likely to prove particularly valuable in time of strikes. The sign, U. S. Mail, will insure passage for a car, when without it the probabilities are that no cars could be run.

The reproduction from a photograph shows one of the mail cars recently put into service on the Third Avenue line, New York City. The cars measure 20 ft. over end



A Combination Passenger and Mail Car for Street Railroads.

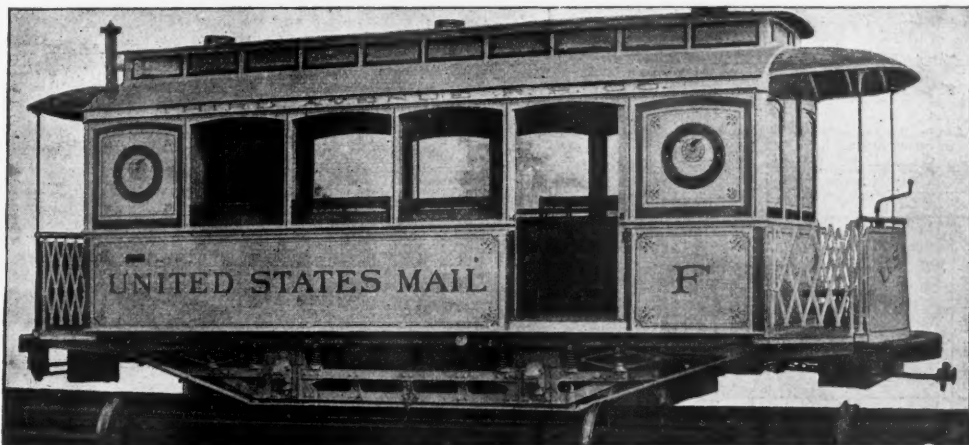
panels, and are 7 ft. 6 in. wide. They are arranged with 380 pigeon holes, drawers, large tables for the sorting and handling of mails, etc. Doors are provided on each side, placed diagonally opposite each other. There is a mail bag rack at one end of the car accommodating eight mail bags. The windows are protected with screens, to prevent any possibility of mail falling out of the car. The inside finish is in solid ash, with decorated veneer ceilings, and Pintsch gas lamps. The cars were designed after the patterns submitted by the postal authorities, simplicity of construction, and use of all available space being desired.

Westinghouse Brake Trials in England.

Last May some comparative trials of the efficiency of the quick-acting and ordinary Westinghouse brakes were made on the North Eastern Railway of England. They were made under the directions of Mr. Wilson Worsdell, Locomotive, Car and Wagon Superintendent of that line. The report has just reached us in the English journals, and we give below some extracts from it and

some comments by the two chief English engineering journals. The results are so completely and conveniently shown in table No. 1 that we do not print this part of Mr. Worsdell's report. This table was compiled and printed by *Engineering*, from which journal we take it with some re-arrangement. Table No. 2, showing percentages of retardation, is also from *Engineering*. It will be observed that the stops were at unusually high speeds—that is, from 33 miles an hour up to 66½, which is the most interesting fact about the tests for American readers who have long been thoroughly familiar with the relative efficiency of the quick acting and ordinary brake. The first extract is from the report of Mr. Worsdell:

The object of these trials was to ascertain the efficiency of the Westinghouse quick-acting brake as compared with that of the ordinary Westinghouse brake. For this



Postal Car for the Third Avenue Cable Road, New York City.

purpose some rolling stock was selected fitted with the Westinghouse quick-acting brake, which could be instantly converted to the ordinary brake by turning the handles of the cocks of the triple valves to their appropriate positions. This manipulation cuts out the quick-acting parts, and leaves only the ordinary triple of the valve in operation. Only a few of the carriages had the quick-acting brake apparatus in its most approved form, whereas the others were fitted with a "converted" apparatus, viz., ordinary Westinghouse brake fittings "converted" to the quick-acting system. In this case, therefore, the same train was used for the experiments with the two kinds of brake, and the results are consequently strictly comparable.

If the average retardation or stopping power of the two brakes be taken over these experiments, the quick-acting brake gives 8.48 per cent., and the "ordinary" 7.01 per cent., which, at a speed of 60 miles an hour, would mean in stop distance 297 ft. less run by a train fitted with the quick-acting brake. I do not consider any of the stops remarkable for efficiency. This, however, may be due to the train not having all wheels braked, all six-wheeled vehicles being in use, and in each of these two wheels were unbraked.

In looking over the report of the trials on the North Eastern Railway in July, 1879, on the York and Knarborough Branch, I find that at a speed of 51 miles an hour on a falling gradient of 1 in 1,200 a stop was made with a train of 18 vehicles, including the engine and tender, in 196 yds., giving a retardation of 14 per cent.; and on another occasion, with a train of the same composition, and at a speed of 50 miles an hour, the stopping distance was 173 yds., and retardation 16 per cent.; the highest percentage or retardation obtained on May 28 and 29 last was 9.1, with the rails quite dry on both days.

In the trials of July, 1879, the brake power was equal

made piped vehicles, but when this was done quick action was almost entirely stopped. This, after investigation, was found to be due to the method of conversion, the distance between the cylinder and triple valve being too great. All vans and brake thirds are fitted with the quick-acting apparatus in the most approved form, and, if a train of this kind had been made up, I think the results would have been better.

These trials have therefore shown that the conversion of the ordinary brake under its present form is not equal to the quick-acting apparatus most recommended. I understood from Mr. Kapteyn that he would look into this matter with a view to making some improvement in the method of conversion, which would be necessary, if at any time it should be considered advisable to adopt the quick-acting brake on stock already fitted with the ordinary brake.

What follows is from *The Engineer*:

We have selected [for the diagrams] the emergency stops which were made on the 29th of May at Acklington on a falling gradient of 1 in 280 with the quick-acting

use of the vacuum brake, with which the whole of their system, and the emergency stop with the ordinary brake at Alnmouth on a falling gradient 1 in 284. The former stop was a splendid stop in every way; whereas in the latter, when the "ordinary" was used, the train broke in two. Fig. 1 gives the diagram relating to the stop with the quick-acting brake, and Fig. 2 shows the action of the ordinary brake. The lines of the diagrams—Figs. 1 and 2—are marked for their different meanings. The moment the driver touches the handle of the brake valve an electric circuit is closed, and a pencil, worked by an electro-magnet, makes a notch in the line, showing the precise moment when the experiment begins, and showing the number of seconds the valve was kept open. In Fig. 1 the line of the pressure in the brake cylinder begins to rise about two seconds later, showing that the action of the brake had been transmitted from the engine to the rear van, a distance of 1,130 ft., in two seconds, and in less than four seconds the brake pressure was at its maximum. If we compare with this Fig. 2, we find that the pressure in the brake cylinder of the ordinary brake hardly asserts itself after four seconds, and does not reach its maximum before nearly 12 seconds have elapsed. This great rapidity of action of the quick-acting system explains why it should be able to stop a train in 100 yards less than the ordinary brake.

The results of the trials have shown very clearly that, in these days of fast running and long trains, the quick-acting Westinghouse brake presents considerable advantages in stopping power over the older form largely used in this country.

In addition to using a powerful brake, however, it is of the utmost importance that every wheel in the train should be braked, and the engines should not be an exception to this rule. In the United States, even the bogies of the engines are now equipped with brakes with the most happy results. [Not universally by a very great deal.—EDITOR.] The days are now past that locomotive superintendent thought a locomotive too nice a bit of mechanism to ruffle its feelings by the application of blocks, rubbing it the wrong way. Sentimentality in this direction has happily died out, and things are being looked straight in the face now. English railways have been slow in keeping pace with the progress made in brake matters. They still use the ordinary Westinghouse brake, although the quick-acting system has for a number of years been a complete success.

In other countries the preference is given to the quick-acting system, and, as is well known, a considerable portion of the freight trains in the United States are now equipped with that brake, and, as a consequence, the speed of freight trains has been increased in many cases up to the speed of fast passenger trains, with complete success and safety.

The following extracts are from *Engineering*:

In our opinion the great virtue of the quick-acting brake, as compared to the earlier type, is that it enables a long train to be brought to a stand in the shortest distance possible without the violent rebound and consequent jerks formerly experienced. It must also be pointed out that although the results show the quick-acting brake to be greatly superior to the ordinary system, upon the trials it did not work under conditions favorable for comparison. The majority of the vehicles were fitted with apparatus which, until recently, had been used with the ordinary triple valve, and had been converted to the new system by adopting in the old fittings a quick-acting triple valve. Although an efficient apparatus may thus be made, as is shown by the experiments, it is not one which will give results equal to those attainable with the quick-acting apparatus fitted in new installations. Further, it may be noted that the ordinary Westinghouse brake used on the trials had the benefit of the 3½-in. triple valve belonging to the quick-acting brake, in place of the ordinary 2½-in. valve. It may thus be fairly anticipated that on further trials to be carried out the new system will show to more decided advantage. At present the advantages of the quick-acting brake, as shown by the trials with which we are dealing, may be considered the minimum attainable.

The Northeastern Company has alone, among the large English companies using the Westinghouse brake, given the preference to the newer form; but as trains increase in length, and speeds are augmented, a change in this respect may be expected. We hear, by the way, that the Northern Railway of France has decided to abandon the

rolling stock has been equipped, and is replacing it by the Westinghouse quick-acting brake.

TABLE II.
Average Percentage of Retardation in the Emergency Stops.

Number of experiment.	May 25.	Number of experiment.	May 29.	Average for the two Days.
	per cent.		per cent.	per cent.
2	8.75	2	7.75	
3	9.10	3	8.25	
6	7.75	6	8.8	8.67
8	9.10	8	8.4	8.30
	34.70 + 4 = 8.67		33.29 + 4 = 8.30	16.97 + 2 = 8.48
10	7.0	11	7.0	
12	6.7	14	7.0	7.28
13	7.05	15	6.25	6.75
15	8.4			
	29.15 + 4 = 7.28		20.25 + 3 = 6.75	14.03 + 2 = 7.01
				Difference 1.47

7.01 per cent. at 60 milcs means 1715 ft. stop distance.
8.57 " " " 1418 " "

Average difference in favor of quick-acting brake. } 297 ft. or almost exactly 100 yds.

TABLE I.—TRIALS OF WESTINGHOUSE ORDINARY AND QUICK-ACTING BRAKES—NORTH EASTERN RAILWAY.

No. of Experiment.	Place of stop near station.	Gradient of line, <i>f</i> , falling; <i>r</i> , rising.	Kind of stop.	Speed. Miles per h. taken from		Stop distance.	Retardation.	Remarks.
				Stop watches.	Diagrams.			
								yd. s. p. c.
Brake Trials Made on May 28, 1895.—Weather Fine. Rails Dry.								
1	Plessey.....	f 1 : 217	Station stop	45½	45½			
2	Longhirst.....	f 1 : 600	" "	52	52½			
3	Chevington.....	r 1 : 330	Emergency	50	50½	315	8.75	
4	".....	"	Signal stop					
5	Alnmouth.....	f 1 : 284	Emergency	50	50¼	3.6	9.1	
6	Fallowden.....	f 1 : 150	" "	66½	66½	695	7.75	
9	Tweedmouth.....	f 1 : 245	" "	46½	46½	280	9.1	
10	Windmill Hill.....	f 1 : 190	" "	65	62	668	7.0	
11	Lucker.....	f 1 : 4332	Station stop	48	48½			
12	Long Houghton.....	f 1 : 170	Emergency	59½	59¾	650	6.7	
13	Widdrington.....	f 1 : 471	" "	51	50½	415	7.05	
15	Cramlington.....	f 1 : 224	" "	44	45	283	8.4	
Brake Trials Made on May 29, 1895.—Weather Fine. Rails Dry.								
1	Plessey.....	f 1 : 217	Station stop	40	40½			
2	Morpeth.....	Level	Emergency	51	41½	245	7.75	
3	Longhirst.....	f 1 : 600	" "	45	45½	285	8.25	
4	Wetherington.....	r 1 : 1624	" "	33	32¾	246	4.24	On every alternate vehicle the brake apparatus was shut off.
5	Chevington.....	r 1 : 330	" "	39	39¼	343	4.65	ditto.
6	Alcington.....	f 1 : 280	" "	38	38	391	8.8	Train broke in two. Distance between the two portions, 48 yds.
7	Alnmouth.....	f 1 : 284	" "	44	44½	136	7.0	The majority of the screw couplings were slackened.
8	Fallowden.....	f 1 : 150	" "	56	55¾	453	8.4	
10	Beal.....	Level	Signal stop	60	57	430(?)		
11	Windmill Hill.....	f 1 : 190	Emergency	55	54	514	7.0	
12	Lucker.....	f 1 : 4332	Station et'ps	..	38¾			
14	Widdrington.....	f 1 : 471	Emergency	..	41	276	7.0	Severe shock; three screw couplings and one draw-bar hook broken.
15	Cramlington.....	f 1 : 224	" "	35	35	235	6.25	Violent shock, but no breakages.

Brakes used: Trials of May 28.—Stops 1 to 9 inclusive, quick acting. Stops 10 to 15 inclusive, ordinary.

Brakes used: Trials of May 29.—Stops 1 to 6, also 8 and 9, quick acting. Stops 7, also 11 to 15, ordinary.

Particulars of Trains, May 28.

Stops.	No. of vehicles.				Length of train, feet.	Weight of train, tons.	Percentage of train braked.			
	1 to 5	6 to 12	13 to 20	21 to 29			Engine.	Tender.	Vehicles.	Total.
1 to 5 and 13 and 15...	18	11	20	681	324	19.76	41.91	69.84	58.85	
7 to 13.....	29	14	40	485	249	19.76	11.91	69.11	54.40	

Particulars of Trains, May 29.

1 to 7 and 14 and 15...	30	65	32	1131	476 1/2	19.76	41.92	*70.25	*62.3
8 to 12.....	24	53	26	915	401	19.76	41.92	63.96	60.3

*In stops 4 and 5 the percentage of weight of train braked was, vehicles 35.13; total train, 34.08.

The Ackerman Method of Face-Hardening Armor.

Considerable attention has been attracted recently to a modification suggested by Lieutenant A. A. Ackerman, U. S. Navy, in the method of treating armor plate in supercarburizing it after the Harvey process. Mr. Ackerman's modification is explained in the article which follows, which is generally in his own words as in a manuscript prepared for us. It is fair to say that high experts have expressed serious doubts as to the value of this modification, and especially Mr. Henry M. Howe, in the discussion of a paper prepared for the United States Naval Institute and published in the *Proceedings* of that institute, has made a very strong case against the theory of Mr. Ackerman's process. Of course the modification proposed would, if good for armor plates, be equally good for many other purposes to which the Harvey process is applied.

It is claimed that this process will enable armor of a greater ballistic resistance than that obtained by the Harvey process to be manufactured at a less cost.

The inventor of the new process is Lieut. A. A. Ackerman, U. S. N., who has been actively engaged in metallurgical work in connection with the ordnance and armor of the new navy during the past eight years.

His opportunities have therefore been exceptional, especially as he had in 1882 taken a course in the Department of Ores and Metallurgy at the Smithsonian Institute in preparation for this work.

In the Harvey process of face-hardening, as applied to the armor for our battleships, the plates of mild open hearth steel are super-carburized on one face in a cementation furnace at a temperature above that of molten cast iron. Subsequently, after the finish machining, shaping, etc., this face is water-hardened. Sprays of ice-cold water are directed against both faces of the plate, the pressures of which are modified from time to time, so as to influence the contraction as desired and retain the plate as nearly as possible in the desired shape.

While in the case of thin plates there may be no great difficulty in the process, the expense and risk of loss as the dimensions increase become very serious. In order, for example, to get the same percentage of carbon on the faces of a 3 and an 18-in. plate, the times of cementation are, roughly, 10 and 30 days respectively. Another disadvantage in the case of the thick plates is that through there being a much greater mass of heated material, the initial effect of the chilling medium in producing an extremely hard surface metal is not as deeply felt as in the case of thin plates. This is the reverse of

necessary to prevent the flow of the surface metal. It is, of course, understood that if the rigid hard face permits no forward movement of the metal, then the projectile can only enter the plate by displacing metal toward the rear, and to do this the entire thickness of the plate must resist as a unit.

The process devised to overcome these various objections consists merely in pressing or rolling a series of grooves or pockets in the face of the ingot or forging to be treated; the depth of these grooves and the width of the adjacent ridges being adjusted to the desired depth of carbonization. These ridges can be treated both in cementation and hardening to a certain extent independently of the thickness of the plate. In the cementation furnace, both heat and carbon gases flow into the sides and top of the ridges, while flow out of them can take place only by conduction through their bases into the body of the plate. But as the temperature of any part of the ridge depends upon the amount of heat that flows through it in a unit of time, no more heat can flow out of a ridge through its base than flows into it through an equal area of its surface, or the base would become hotter than the surface and the direction of the flow reversed. As the sides and top of the ridge may easily be made three times the area of the base it can be seen that the ridge must be continually receiving three times as much heat (and the same is true with regard to the carbon gases), as it is giving out. In this manner there is a concentration of heat and carbon in these superficial ridges with a saving of time dependent upon the degree of isolation of the ridges.

In the case of thin plates, or for that matter forgings of any description, these ridges may be subsequently pressed down in reducing the plate to its final thickness. This greatly improves the metal, which tends to become crystalline through the long annealing process of cementation at a high temperature.

An experiment was made with an ordinary nickel steel plate 7-in. thick which was carburized in the same furnace with a 5-in. plate. No attempt to save time was made, the plates being treated as if they were smooth faced. This does not show the relative degree of carburization in ridges and flat surface, and was unfair to the process for the reason that after 10 per cent of carbon is reached near the surface but little increase is obtained by prolonging the treatment. Had the firing been stopped, for example, much earlier than usual, the ridges would have had approximately the same amount of carbon as at the end, while the smooth surface would have had much less.

One of the widest ridges, in which the area of the base was about one-half that of the sides and top showed no great benefit in consequence. In one in which the base was about two-fifths the exposed part the results of analyses from the same plate, showed that at equal depths from the surface the ridge had gained on an average about 35 per cent. more carbon than the flat surface. In other words the increment of carbon was about 45 per cent. greater in properly designed ridges.

Practical men, however, will see the difficulty of forging these ridges down without leaving seams and bad welds between them. The inventor is not concerned about that; he declares that the presence of seams and cracks in the hardened face has no effect on the ballistic resistance. Numerous experiments have demonstrated this to be the fact both in the case of Harveyed and Gruson armor. Such cracks have never been found to initiate, prolong or give direction to those solely due to the impact. In fact it is the inventor's intention to leave the ridges, which in that case will be somewhat wider, intact in the case of thick plates. By so doing it will be possible to harden their surfaces without regard to the thickness of the plate, leaving their cores tough and so producing a girder-like structure of hardened steel imbedded in a tough matrix. The advantages of this over the

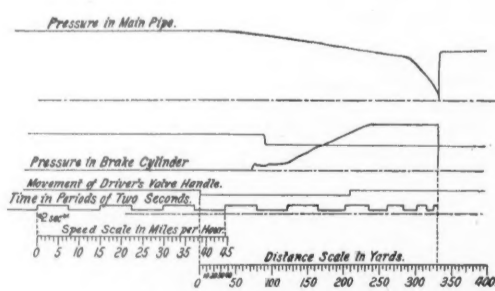


Fig. 2.—Emergency Stop on Approaching Alnmouth—No. 7.

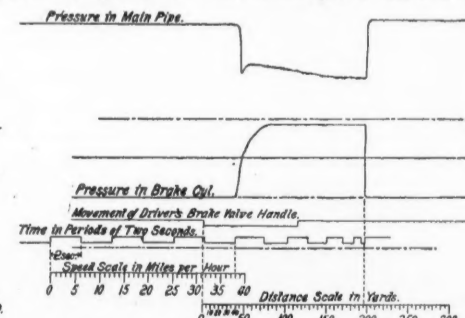


Fig. 1—Emergency Stop near Aclington—No. 6

same time, the metal at the heart of the larger mass, being less benefited by the previous forging, is actually poorer in quality and less able to withstand such stresses.

Still another objection found to the present process is that the percentage of carbon and consequent hardness ordinarily diminishes gradually from the surface to a point about two inches deep where the normal characteristics are found. This, Lieutenant Ackerman states, decreases the thickness of the actually tough part of the plate more than is desirable. As it is really this part of the plate which absorbs the energy of a sound projectile (for projectiles are made which cannot be broken up by the first impact on the hard face) through allowing work to be done upon it, the plate is weakened by increasing the true depth of the brittle hard surface over the amount

old plan are obvious as the new face being braced in such a variety of ways would be far more rigid. A mild treatment only is needed to effect the isolated ridges, and thus the stresses so dangerous to heavy plates are avoided, while the actual effect of the hardening can be made to penetrate as deeply as desired.

Although the plate previously referred to had been grooved with an eye merely to experiment with the carburization, the ridges being much narrower than desirable to enable the retention of a tough core (in fact they contain sufficient carbon to harden through and through), it was determined to harden and test the plate. This was done to gain information as to the behavior of the ridges both while being chilled and when under impact.

The plate was hardened without difficulty, there being

no snapping or flaking of the ridges. At the test at Indian Head, a Carpenter 6-in. shell with a striking velocity of 1,816 ft. per second and an energy of 2,289 ft.-tons penetrated 6.75 in. No cracks were formed.

A second shot was then delivered with the maximum velocity of the gun, 2,100 ft. per second and an energy of 3,061 ft.-tons. The ogive and bounelet penetrated the plate, the shell being held in that position much shattered.

When it is understood that the ridges were brittle and hard through and through and were neither well proportioned nor spaced, the result is quite remarkable. This is especially the case as it was not the inventor's intention to retain the ridges on so thin a plate where they decreased the sound thickness of the plate fully 14 per cent.

Later tests against the smooth parts of the same plate showed as was to be expected a slightly greater resistance. It has been fully demonstrated, however, that both in carburization, hardening and test, the inventor's theories are correct and that a cheaper and better armor can thus be made.

In service plates of course, the pockets would be smoothed over with cement to make a better appearance.

Taunton Sprinklers and Snow Plows for Street Railroads.

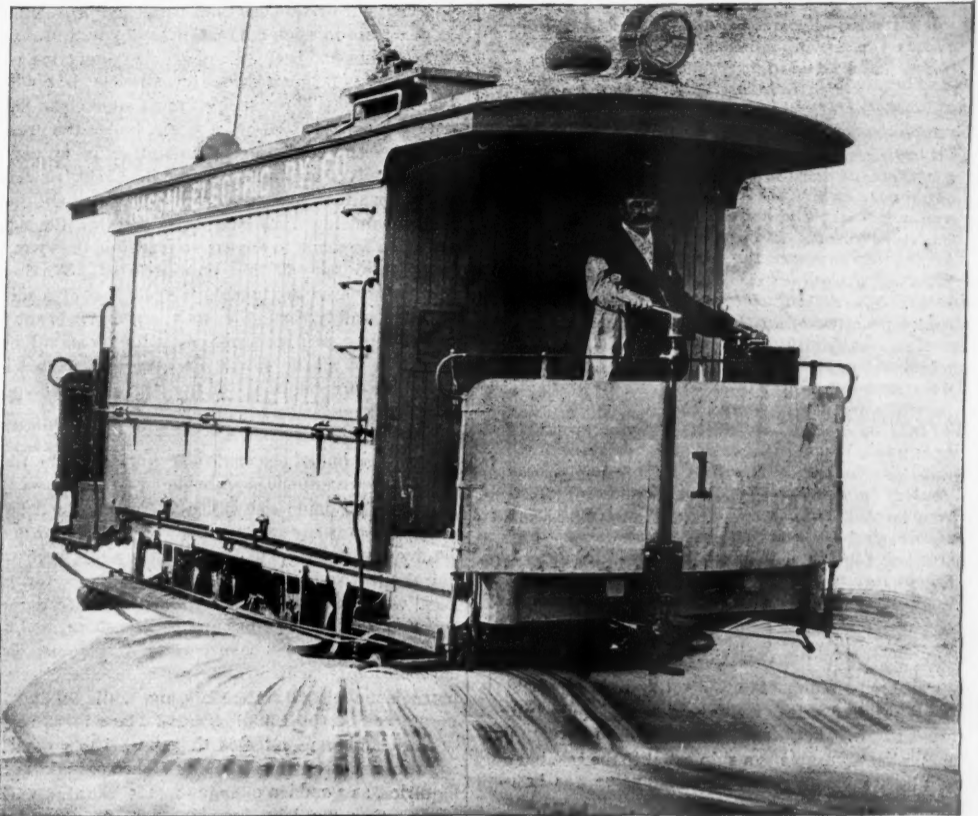
The Taunton Locomotive Manufacturing Co., of Taunton, Mass., has recently designed a sprinkler for street railroad use which is shown in the accompanying illustration, Fig. 1. Three of these sprinklers have been built so far, one of which is in use in Bridgeport, Conn., one is now at the Montreal Convention of the American Street Railway Association, while a third is in use on the Nassau Electric Railway of Brooklyn. The car, which resembles an ordinary street car, is 22 ft. long and weighs when empty about 7 tons. The tank is of $\frac{3}{8}$ -in. steel plate riveted to cast-iron heads at either end. It is about 6 ft. diameter and 13 ft. $\frac{2}{3}$ in. long, and holds 2,700 gals. The use of this tank in Bridgeport shows that it will sprinkle about four miles of track. One of the cast-iron heads mentioned is provided with a manhole for cleaning out the tank. The latter is designed to stand at least 150 lbs. pressure and is riveted with the same care that is used in locomotive construction. The plates are so arranged that no seam comes on the bottom except the single circumferential seam in the middle, which seam is double riveted. The tank is provided on each end with an indicator which shows when it is full and the rate at which it is being emptied. This will enable the operator to gage the speed and to distribute the water accordingly. The sprinkler pipes project $10\frac{1}{2}$ in. outside of the sills on either side of the car and are of brass with removable ends to allow of flushing. The size of the holes in the sprinkler pipes may be arranged to suit the work for which the sprinkler is to be used. They are usually made $\frac{3}{8}$ in. Two valves called butterfly valves, are placed in the sprinkler pipes, which makes it possible to sprinkle either the track alone and some little distance each side of it, or the street on one side of the track in addition to the track, or the street on both sides as desired. The full width which the car will sprinkle with these valves open is 20 ft., or 10 ft.

top of the car a 4-in. filling hole is provided, with which the tank is easily filled from a two-nozzle hydrant in five minutes, or from a single nozzle hydrant in less than nine minutes. The indicator, of course, shows, when the tank is full. Each car is provided with a length of filling hose, which is to be used in connection with an ordinary hydrant.

While the tank is perfectly tight a certain amount of condensation will cause dripping, and to protect the

sible to lift it by merely overcoming the friction of the lifting parts. The share is operated by a hand wheel, and by the use of a ratchet and pall on the floor is held securely in any desired position. Its forward end projects 21 in. outside of the track and its rear end 18 in. beyond the other side of the track.

The total weight of the plow, without the motor, is about seven tons. The axles, pedestals, etc., are the same as those used for the sprinkler described above. The



Taunton Sprinkler for Street Railroads.

motors a drip pan made of cast iron 11 ft. long and 2 ft. wide extends under the entire length of the tank, and is drained to the street.

The woodwork of the car surrounding the tank is not continued for the entire height of the car, but two long windows are left, one on each side, which are shown in the engraving, covered with canvas curtains. This gives ample ventilation, and gives the car the appearance of an ordinary summer car. Doors are placed in the sides of the car below the windows which open into lockers for the storage of hose and tools.

One of the most interesting devices made by the above company is the share snow plow for double track work

brake mechanism is also similar. Beyond the small amount of operating machinery at each end of the interior of the cab the floor of the latter is clear and may be used for carrying salt, sand, tools and men.

We are indebted to Messrs. Wendell & McDuffie, of 26 Cortlandt street, New York City, who are the general eastern agents for the Taunton Company, for the information used in the above description.

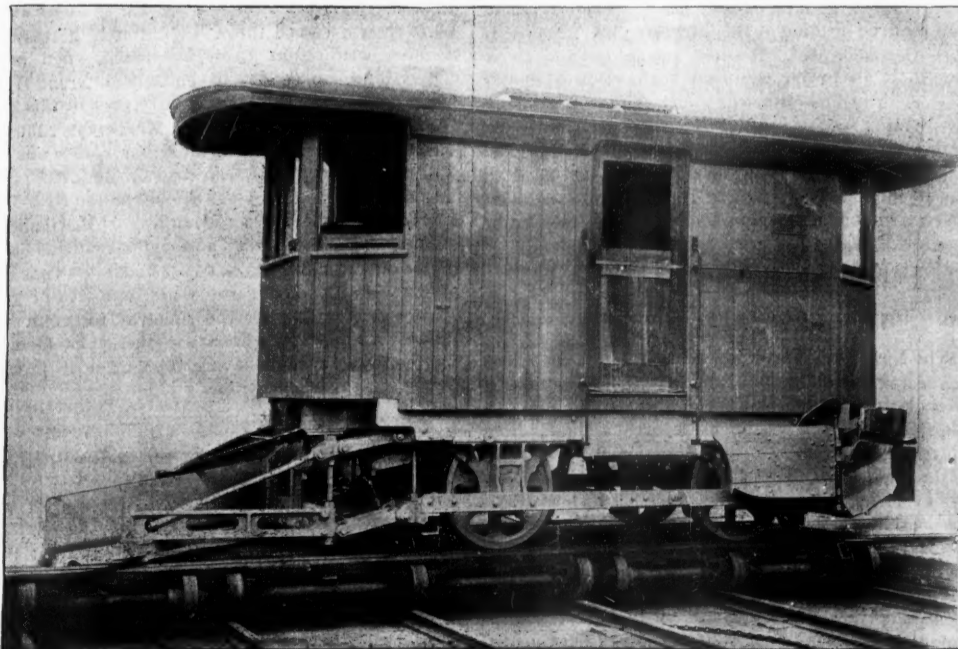
Foreign Railroad Notes.

Russian journals report that charters have been given to Russian interests for the construction of several railroads in Persia, which are regarded of great importance for Russian trade. One of the first to be built, it is supposed, will be a line from the Caspian to the Persian Gulf, affording a direct outlet for the vast Volga Valley and the petroleum wells to the Indian Ocean.

A correspondent of the London Times writes from Odessa concerning the progress of work on the great Siberian Railroad, as follows: "The northern portion is almost 40 per cent. finished, and the work of laying the rails between Station Gafsky to Khabarovsk is advancing with such rapidity that it will be completed by the end of next year, and the Amour district—about 900 versts—will be commenced next January. The clearing of the land between Irkutsk and Sraetensk was commenced last spring. The double line of rails for upward of 300 versts have already arrived for the Zabaikal portion, but this part cannot be finished before 1899, while the line between Krougo and Baikal will not be completed till one year later. The ice-breaker or steamer which is to keep up communication during winter on Lake Baikal is to cost 800,000 roubles, and will easily cut through ice 5 ft. thick. In Central Siberia from the river Obi to Irkutsk 300 versts of line is already completed, and the other portion of the work is going on rapidly, although it is not officially expected to be finished before 1898. In Western Siberia the railway from Tchelyabinsk to the river Obi will be finished during the present year, and at the present time the line from Tchelyabinsk to Omsk is open. The portion between Perm and Katalassky has just been commenced, and will be finished by July 1, 1898. From the above an idea may be gained as to how energetically the work is being carried on between Vladivostok and Tchelyabinsk, a distance of 7,080 versts. The remaining portion from Tchelyabinsk to Perm, nearly 3,000 versts, will be rapidly pushed forward, as all the necessary engineers, workmen and tools are now in that part."

Electric Towing on Canals.

Press reports say that the erection of the poles has been begun for the system which is to be placed on a section of the Erie Canal for testing electric towing of canal boats by the Cataract General Electric Co.



Taunton Share Snow Plow for Double Track Street Railroad Use.

each side of the center of the track. Otherwise it sprinkles about 8 ft., or covers the roadbed and $1\frac{1}{2}$ ft. outside the rail. The main valve, which is of simple construction, is controlled by a handle on the platform at the right of the motorman. There is one of these levers at each end of the car.

The axles of the car are 4 in. in diameter, and the journals, pedestal castings, etc., are all heavy. The brake mechanism is so arranged that 25 lbs. pressure on the brake handle gives 1,000 lbs. on each brakeshoe. At the

which is shown in Fig. 2. The share at first sight would appear narrow, being but 14 in. wide at the forward end and 24 in. at the heel. This width, however, has been found best suited for ordinary city work, although the share may be made of any desired height, as is best suited for the requirements of the particular service for which the machine is to be used. The weight of the share and its connecting mechanism is about 650 lbs., which is counterbalanced by a heavy weight thus relieving the entire weight of the share and making it pos



ESTABLISHED IN APRIL, 1856.
Published Every Friday
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

We are not inclined to attach very much importance to the Deep Waterways Convention, lately held in Cleveland, and which we have reported quite fully in recent issues. Very likely it will help to develop public opinion favorable to a ship canal to the sea, but only very little information of scientific value was brought out. There were a few papers of real value, which attempted serious studies of definite subjects or which actually described facts, but most of the papers were speculative to the last degree. What would it cost to get a 21-ft. waterway from the Soo to the Atlantic, and to deepen the principal lake harbors so that they would take vessels drawing 20 ft.? What would it cost to get 26 ft.? If a 21-ft. canal was in existence to-day from the lakes to the ocean, could ocean-going ships afford to use it? The convention voted for a 21-ft. channel now, and all "permanent structures" to be built for 26 ft.; but who is to pay the interest on the extra cost of these permanent structures during the period between the developed 21-ft. channel and the 26-ft. channel? These are some of the great questions which the convention did not try to answer—did not even discuss, so far as we have seen. Meanwhile, the people of the State of New York are confronted with the question of spending \$9,000,000 on improvements of the Erie Canal, a project which seems quite practicable, and which a body so intelligent and so deeply interested as the New York Produce Exchange says is entirely adequate to the needs of commerce, and which the Chamber of Commerce has also endorsed. One would suppose that if the members of the Association who gathered at the convention had really wanted to get something done to lower rates to the sea they would have encouraged this work with something more than a dozen perfunctory words.

The use of green lights to indicate "all-clear" on signals at night was "approved as good signal practice" by the American Railway Association Committee on Signals in the report made by it to the Association last spring. That the use of white lights for all-clear is bad practice was not thus explicitly declared, though many persons, including some members of the committee, hold that such is the case, and, indeed, that the second declaration is almost a necessary corollary of the first. Such persons have not made very great headway with their argument for the substitution of green lights for white, chiefly because the danger of using white is claimed by the conservatives to be mostly theoretical; and we do not know whether the advocates of a change desire to renew the discussion of the subject at the conventions next week, but if they do, they have a striking object lesson in a collision which occurred on a trunk line Sept. 26, in consequence of the engineman thinking he saw a white light, giving him the right to proceed, when, in fact, the signal light was obscured by smoke, and he was in reality looking at another white light some 450 ft. farther off. The collision occurred in this way: Train No. 4, eastbound, passing from single to double track, stopped at a station with the hind car, a sleeper, foul of the westbound track. Train No. 1 approached

while No. 4 was receiving passengers, and the engineman, thinking he had a clear track, and not being required to stop at this station, proceeded at good speed. He saw his mistake before he struck the sleeping car, but not in season to stop. The collision broke the steam chest, and three passengers who had just entered the sleeping car were badly scalded, as well as otherwise injured. This, as we have said, is a striking lesson—or at least it would seem so if it were your private car that happened to be on the rear of a train in such a situation, and you in it. One point that has not been mentioned in connection with the advocacy of green lights for all-clear, but which all experienced superintendents must appreciate, is the very good loophole that often exists, under the present practice, for an engineman to manufacture an excuse when he fails to heed a danger signal. Lights in streets and houses are so numerous that the statement that a deceptive outside light was mistaken for the signal may often be made to appear so plausible that you are compelled to take it into consideration. We do not mean to say that enginemen will lie out of a scrape any more readily than other men, nor that it is not fair to discharge a man who runs past a danger signal, even in the face of all the stories he may present; but it is in the line of good discipline to remove all such opportunities for prevarication.

Last week one of the electrical journals said that a special meeting of the stockholders of the Illinois Central Railroad had been called to confirm the decision of the directors to equip their suburban lines for operation by electricity. The further statements were made that the Burnside shops are to be equipped for electrical working and that bids for all of this equipment, both for working the lines and for the shops, had been received. While we have become accustomed to the irresponsibility with which some of the electrical journals make such statements, and while we had kept some track of the Illinois Central plans in these particulars, and were satisfied that there was no truth in the announcements, we thought it well to make special inquiries, as a sudden change of plan might have been made. Our inquiries have been made not only of officers of the Illinois Central Railroad but elsewhere. The sum of the matter is that the Illinois Central people are considering seriously the possibility of the use of electric motive power in suburban service. The question is, however, one of great and extraordinary complication, and no plan has yet been worked out by which electricity can be applied there, nor have any bids or estimates been made by the electrical companies, unless it may possibly be some very general ones as a starting point for further study. It is not at all impossible that a satisfactory scheme, both mechanical and financial, may be worked out for electrical equipment of these suburban lines; but, considering the immense physical difficulties of the situation, we doubt if such a result is at all imminent. It is certain that nothing definite has yet been arrived at, and that the meeting of the directors has nothing to do with this project. It is also untrue that the Burnside shops are to be equipped with electric motive power. The only electrical equipment there now is the lighting station. All of the new shops will be electrically lighted, and a few small motors are used to run portable machines for facing off valve seats. It is not by any means impossible that the use of small electric motors on machine tools may be extended in those shops as is being done in other shops, but no revolution is in progress there or contemplated.

The Bay Ridge and Woodlawn Collisions.

The New York State Railroad Commissioners have made a report on the fatal collision which occurred at Woodlawn on the New York & Sea Beach Railroad, Sept. 2, and which was briefly reported in the *Railroad Gazette* of Sept. 6. Fourteen persons were seriously injured and two of them died. The Commissioner holds that the engineer of the engine which ran away is responsible for the collision, having failed to exercise ordinary care and judgment. It was stated in the newspapers that this engineman was burned by coals from the firebox in the first collision, and there are conflicting stories concerning what he did and what he might have done to control his engine; but the questions raised are so largely speculative that we will not weary the reader with a rehearsal of them. They are of a kind that frequently arise in cases where an engineman deserts his engine and it runs away, and their discussion settles nothing.

They are especially unprofitable in view of the fact that there is one simple preventive of runaways which is familiar to all enginemen and which is practically better than all others. We mean placing the reverse lever in the middle position. The habit of reversing, when it is desired to stop quickly, is so natural and so deep-seated in all enginemen that an exhortation to

change it may be as futile as an attempt to sop up the Atlantic Ocean, but we do not see that successive runaways, month after month, bring out any other remedial lesson, and the one here suggested certainly is simple. With effective driving-wheel brakes nothing that can be done by means of the cylinders, either the use of steam or of compressed air (as in reversing while the engine is running forward) gives any aid in stopping an engine in its normal condition; and if, in addition to the brakes, or without them where they are not available, the valves are placed in the neutral position, everything that can be done has been done. To use steam after reversing often revolves the drivers backward, and that, like sliding the wheels without revolving them, is less effective in retarding the speed of the engine than to apply a more moderate force.

If enginemen wish to reduce the number of runaways they should cultivate the habit of "throwing her over" only half way. But runaways are, at the worst, so very infrequent that the subject does not fill a very large place in any one engineman's mind; and so, as we have already intimated, we do not expect that this note will have instantaneous revolutionary results.

The chief grievance of the New York daily papers in connection with this collision was that the runaway engine was not stopped by telegraph, and they enlarged upon it at considerable length; but the commission did not look at the matter in that way, and they are disappointed. Says one of them:

The most striking thing disclosed by the investigation was that the railroad had no telegraphic signals, and that there was no means whatever of sending word along the line that an engine was bearing down upon the unfortunate train. Yet the Commissioners have not a word to say on this vital matter. It is no wonder that people are asking themselves what is the use of the State spending large sums of money year after year for the maintenance of its Railroad Commission.

As to how well we are getting our money's worth out of the commission, we are not prepared to say off-hand; even a poor commission is sometimes of great value as a safety valve; but on the telegraph question this report is right in dismissing the complaint. The chances of a telegraph or telephone being of service in stopping a runaway within three miles of where it started are so exceedingly small that they cannot be computed; and when, in connection with this, we consider the extreme infrequency of runaways on a level railroad only six miles long, the absurdity of the demand for a telegraph for this purpose is obvious. Quite likely a wire would be of service on the New York & Sea Beach road for other purposes, but, from the circumstances as reported, it seems extremely improbable that the station agent at Woodlawn would have been able to do anything, even to shout to the passengers, had he been informed about the runaway as soon as anyone could have wired him. The daily paper experts seem to forget that the stories they read of heroic telegraph operators who turn switches at the risk of their lives and throw raging iron horses into the ditch, writhing in agony, are based, when based on anything, on conditions entirely different from those on Long Island. Authentic reports of this kind will be found to refer to places where the runaway started from a point close to a telegraph office and had a considerable length of clear road before it.

As for the infrequency of switches on the New York & Sea Beach, which was condemned by the dailies, it should be remembered that, although a switch is handy in case of a runaway, it is costly and somewhat dangerous every day during the years or scores of years that we are waiting for the runaway to occur. We know of stations now without switches which formerly had them, the change having been made to promote the safety of passenger trains.

The Right of Witnesses to Refuse to Testify Against Themselves.

We have received the full text of the opinion of Judges Acheson and Buffington, delivered at Pittsburgh, Sept. 11, which was briefly reported in these columns Sept. 20. This is the habeas corpus case of Mr. Theodore F. Brown, auditor of the Allegheny Valley, who refused to testify before the Grand Jury last May, when that body was considering an indictment against E. F. Bates and Thomas R. Robinson, officers of the road, for discriminating in freight rates. Mr. Brown refused to testify on the ground that his answer would tend to criminate himself. The fifth amendment to the Constitution of the United States provides that no person shall be compelled in any criminal case to be a witness against himself. In the *Counselman* case (142 U. S., 547), the witness was excused, under the Constitution, the Court holding that section 860 of the Revised Statutes, which aims to secure testimony by promising immunity to the wit-

ness, did not supply a complete protection from all the perils which the constitutional prohibition was designed to guard. Then, on Feb. 11, 1893, a more definite law was passed, providing that no person shall be excused from testifying, etc., under the Interstate Commerce law, and promising that such a witness should not be prosecuted or subjected to any penalty or forfeiture, etc. The constitutionality of this act is now challenged by Brown, on the ground, First: that the constitutional provision already quoted is a protection not only from pains and penalties, but from the infamy which follows the disclosure of the commission of a crime, that the act simply relieves from pains and penalties; Second: that the act does not give a protection as broad as the constitutional privilege because it places the witness under the necessity of proving the fact, etc., of his having been called to testify and leaves him exposed to the jeopardy of conviction, and, Third: the act is in substance a pardon and an infringement on the pardoning power vested by the Constitution in the Executive.

Judge Buffington, in his decision, first cites Chief Justice Black (21 Pa. St., 164) and other authorities, to the effect that the courts should be very cautious in declaring laws unconstitutional. Judging from the character of the Constitution, it is fair to assume, he says, that if the right to be shielded from disclosures merely tending to humiliate or disgrace had been deemed worthy of the dignity of constitutional protection it would have been plainly stated. "To our mind it is clear the infamy or disgrace to a witness which may result from disclosures made by him are not matters against which the Constitution shields, and that, so long as such disclosures do not concern a crime of which he may be convicted, the provision quoted does not apply." This is sustained by references to Parkhurst vs. Lowton (1 Merivale, 400), decision by Lord Eldon; Commonwealth of Pennsylvania, Ex Rel. Keller vs. Roberts (Brightly's Reports, 109) and Jennings vs. Prentice (38 Mich., 421). In the Counselman case the witness was not protected from subsequent prosecution on facts which would be incidentally disclosed by this testimony; but, owing to the act of 1893, no such consequence can ensue if Brown is made to answer. Such being the case, says Judge Buffington, the constitutional provision does not concern him, and, if it does not, the act which compels him to testify is not unconstitutional. Brown was remanded to the custody of the marshal. The court states that the case of U. S. vs. James (60 Fed. Rep., 257), by Judge Grosscup, Feb. 26, 1894, was duly considered, but that the present opinion is sustained by the Supreme Court of New Hampshire, State vs. Nowell (58 N. H., 314), and the Supreme Court of California in ex-parte Lewis Cohen (26 L. R. A., 423).

With all due respect to the courts of England, Pennsylvania, New Hampshire and California, we venture to guess that a majority of the Supreme Court of the United States, to which this case has been appealed, will agree with Judge Grosscup, who delivered the opinion in the James case, rather than with Judge Buffington, who wrote this one. The common sense inference from the words of the Constitution, is that they shield the witness against all consequences of every kind that might result from his testimony, so far as he can be shielded by simply having the privilege of holding his tongue; and Judge Grosscup, in a masterly review of the philosophy of Anglo-Saxon government, and of the state of the public mind at the time the Constitution was made, concluded that the amendment was intended to be thus all-inclusive.

It is true that when a witness merely refuses to testify, openly stating that he is afraid of divulging his own wrongdoing, his own words tend to tarnish his reputation, but that does not justify the state in compelling him to go farther in the same direction. The government, in offering beforehand to pardon the witness, is in precisely the same position as a state's attorney who promises not to prosecute a criminal who will turn state's evidence; and that is a proceeding that often can be justified only on very shaky grounds.

It is true also that some offenses against statute laws do not necessarily constitute moral offenses which a man need feel reluctant to make known to persons whose good opinion he desires to merit; but that does not justify a general rule assuming that all disgrace not sanctioned by a Court is of minor importance, and that efforts to avoid it are not to be allowed to stand in the way of prosecutions. Prosecutions are conducted from all sorts of motives; are often due to the mistaken zeal of a state's attorney who has a liberal appropriation at his disposal, and it is imaginable that a trifling suit might make trouble for a good many witnesses with a great variety of interests in jeopardy.

That acts which constitute infractions of law are not necessarily wrong from a purely ethical standpoint is illustrated in the very law under which this grand jury indictment was drawn, the Interstate Commerce Act.

That law forbids pooling of earnings, declares it a misdemeanor, and prescribes a \$5,000 fine for it; but pooling of traffic or earnings is intrinsically wrong only when it works injury to some passenger or shipper of freight, and it does not by any means produce such a result universally. In England, pooling is freely permitted. On the other hand, secret rate-cutting, in violation of a published tariff which purports to offer equal terms to all men, makes that tariff a lie, and thus can never be justifiable as long as the law, passed by the State, in the exercise of its power to regulate railroads, requires such tariffs to fully disclose the rates on all freight. This difference is recognized in the penalty section of the Interstate Commerce law, the crime of rate-cutting being subject to imprisonment in addition to the fine.

We do not defend rate-cutting. We are as anxious as anyone can be to see the prohibitions of the Interstate Commerce law on this point thoroughly enforced. But the Fifth Amendment to the Constitution, unlike the cities of refuge established for unintentional manslaughter among the children of Israel, does not shield innocent persons alone, but is also a relief to the guilty, whether so intended or not. Its language is so plain and simple that there is no escape from this conclusion, and if we desire to modify the amendment we had better have it amended in the lawful way. To try to get around it by a simple legislative enactment is on a par with the efforts of the members of the legislature of New York to evade the constitutional prohibition of passes, though it is not from such contemptible motives. In fact, the efforts of the Interstate Commerce Commission to bring recalcitrant witnesses to terms undoubtedly spring from the most worthy motives.

The New York, New Haven & Hartford.

The annual report of the New York, New Haven & Hartford Railroad for the year ending June 30, 1895, shows, on the whole, very favorable results for the year's operation, and has some features of special interest. It is true that the general statement shows a deficit of \$315,000 after paying the usual dividend of five per cent. but last year the deficit was \$1,258,000. This year five dividends of two per cent. each have been charged against revenue in order to bring the date for the payment of dividends in the future on the last day of each quarter, and the President expects a continuance of two per cent. quarterly, notwithstanding the increase of stock and bonds. The principal results of operation for the year are given in the table below.

		Inc. per cent.
Miles worked.....	1,464	
Gross earnings from operation.....	\$27,901,735	Inc. 5
Operating expenses.....	19,064,027	Inc. 6
Net earnings.....	\$8,837,708	Inc. 16
Other income.....	234,826	
Total net income.....	\$9,072,533	Inc. 17

The gross revenue of the company shows an increase of nine per cent., or \$2,324,851, over the previous year. Operating expenses bear a ratio of 68.3 per cent. to the earnings, but large charges are included under these expenses which are made to represent depreciation.

The taxes and fixed charges are as follows:

		Inc. or dec., per cent.
Taxes.....	\$1,464,006	Inc. 4
Rental of leased lines.....	3,322,408	Dec. 17
Interest charges.....	846,531	Inc. 36
Total.....	\$5,592,945	Inc. 4
This leaves balance of income.....	\$3,478,989	
Dividends (10 p. c. on \$37,912,900).....	3,791,290	
Deficit.....	\$315,301	

The following table gives a comparison with the results of three previous years:

	'91-'95	'93-'94	'92-'93	'91-'92
Total mileage.....	1,464	1,464	818	508
Total revenue.....	\$28,539,199	\$6,088,006	\$18,737,355	\$12,499,737
Balance of income.....	3,478,989	2,373,677	2,997,999	2,162,291
Balance, D. \$315,301	D. \$1,257,615	S. \$52,403	S. \$58,531	

It has been a well-known fact for some time that the course of freight earnings on the Consolidated system the last year was more favorable than that of passenger earnings. In fact, the earnings from pas-

41.7 per cent. of the total receipts. The year before they were 38.6 per cent., but in 1893 they were 41.8, and in 1892, 39 per cent. Without going back any further, it is apparent that the yearly traffic is subject to these fluctuations in the relative value of the two classes.

Every one is familiar with the fact that the New York, New Haven & Hartford has for a long time been spending extraordinary sums in betterments, making heavy charges to operating expenses, which on most systems would have gone to capital account. The table below, giving certain figures for five years, will show how great these expenditures are. We give the amounts spent on maintenance of track, bridges, fences, etc.; and the total amounts spent on maintenance of way and structures for the last five years, and charged to operating expenses; also what these expenditures have amounted to per mile of track. The amounts charged to operating expenses, which have been spent for repairs and renewals of locomotives and cars, and the totals spent for maintenance of equipment and charged to operating expenses, are also given. Beside these, for three years, we give the amounts spent on additions and improvements and charged to capital account. In 1895 these latter did not include anything for rolling stock, but in the two years preceding some such expenditures were charged to capital.

It will be seen that for maintenance of track, bridges, culverts, fences and the like, the charges per mile for the five years run from \$1,844 up to \$2,476. The total charges per mile for maintenance of way and structures, which includes buildings and other items not properly chargeable to track account, runs from \$2.116 to \$3.171 a mile. A few weeks ago we compiled a table showing the expenditures on maintenance of way per mile for all the railroads of the United States. These ran from \$.22 in 1894 up to \$1.011 in 1892 and \$944 in 1889. A comparison of these figures will give some notion of the extraordinary efforts which the Consolidated has been persistently making for years to put its track and equipment in the highest condition.

The policy of acquiring the stocks and bonds of the lines leased by the company has been carried out on a large scale, \$2,015,423 having been expended to purchase such securities. To pay for this and for large improvements now in progress, including the four-tracking of the New York division and the work on the Providence terminals, a floating debt of \$4,650,000 was incurred. This floating debt is to be wiped out and further sums provided for improvement and equipment by the increase of 25 per cent. of capital stock and of convertible debentures; these sums will be \$9,500,000 and \$3,287,500; in all, \$12,787,500. The debentures are convertible into the company's common stock in 1903.

Reference is made in the report to three matters of peculiar interest. It is announced that the directors have accepted Mr. J. Pierpont Morgan's offer of a majority control of the stock of the New England railroad, and have bought in \$5,000,000 of its new five per cent. bonds. But the statement is made that no consolidation or lease of the New England is contemplated, and that the object of the transaction is to unify the separate organizations now maintained by the two rival companies at competitive points in order that the consolidation of agencies, yards and freight houses at such points may diminish expenses to a considerable degree.

It is stated that the application of electricity on the Nantasket Beach Railroad has proved successful, and the economy of its operation is satisfactory. The only matter still in doubt is the durability of this electrical equipment, and the suggestion is made at the end of the report that the company is only waiting to make sure of the results of this experiment before adopting electricity at other points on its lines.

One of the most significant facts in the whole report is contained in a brief statement that the company has purchased a majority of the stock and bonds of the Stamford Street Railroad, and will develop that property in close relationship with its own system. This move kills a threatening scheme for paralleling the steam railroad by trolley lines. The New Haven Company evidently did not trust to the results which

	1895.	1894.	1893.	1892.	1891.
Miles worked.....	1,464	1,464	818	508	508
Maintenance of track, bridges, etc.....	\$2,700,000	\$2,741,000	\$1,663,000	\$1,208,000	\$1,258,000
Ditto, per mile.....	1,844	1,875	1,973	2,373	2,476
Total maintenance of way and structures.....	3,098,000	3,123,000	2,191,000	1,671,000	1,611,000
Ditto, per mile.....	2,116	2,131	2,584	3,008	3,171
Repairs and renewals of locomotives and cars.....	2,809,000	1,892,000	1,829,000	1,142,000	1,079,000
Total maintenance of equipment.....	3,277,000	2,145,000	1,706,000	1,263,000	1,334,000
Additions and improvements charged to capital account.....	3,796,000	4,445,000	5,088,000

senger traffic, including mail and express, increased during the fiscal year only four per cent., while those from freight increased almost 18 per cent. Apparently, however, this does not indicate the beginning of a revolution. In this last year the freight earnings were

it gained by its fight against the electric roads in the Connecticut legislature last spring, but has chosen the only safe way left of dealing with electric competition by controlling these lines itself. Whatever results may come from this action, they will be closely

watched by railroad men, for a great many companies are now faced by this same problem of electric competition, and are likely to adopt this solution if it proves successful.

New England Passenger Traffic.

The fact that nearly the whole of New England is dependent upon five great railroad systems for its transportation facilities makes some statistics gathered from the annual returns of these corporations to the Railroad Commissioners of Massachusetts of considerable interest. The returns cover the operations of the companies for the year ending June 30, 1895. The New York, New Haven & Hartford, the Boston & Maine, the Boston & Albany, the Fitchburg and the New York & New England roads are the ones covered by the figures.

These five roads carried during the year 103,808,330 passengers, and the passenger mileage was 1,609,891,517, showing that the average journey was 15.51 miles, a low average, but a large proportion of the passenger traffic of these roads is composed of commutation passengers who go back and forth between their homes and their work at least twice a day, and the distance that they travel will not average more than five or six miles.

The Boston & Albany has the longest average journey, 17.51 miles. The Consolidated comes next with an average of 17.22; the Fitchburg is third, 15.61; the Boston & Maine stands fourth, with an average of 13.73; while the New England comes last with its average of 11.30 miles. The year before these five roads carried nearly 1½ million more passengers, but the journey was only 15.18 miles. The effect of the competition of electric street railroads is without doubt seen in these facts of fewer and longer journeys. A tabular statement will give the figures in convenient form for comparison:

Whole Number of Passengers.			
	1895.	1894.	
New York, New Haven & Hartford.....	43,838,676	41,448,324	
Boston & Maine.....	32,380,242	33,351,862	
Boston & Albany.....	12,151,670	12,152,100	
Fitchburg.....	7,109,871	7,116,532	
New York & New England.....	8,237,889	8,146,122	
Totals.....	103,808,330	105,248,900	
Total Passenger Mileage.			
	1895.	1894.	
New York, New Haven & Hartford.....	747,003,723	725,250,069	
Boston & Maine.....	444,496,640	447,534,671	
Boston & Albany.....	212,832,031	215,441,817	
Fitchburg.....	112,439,598	111,585,909	
New York & New England.....	93,124,525	95,523,419	
Totals.....	1,609,891,517	1,598,433,875	

While the Consolidated leads in number of passengers and passenger mileage, the Boston & Albany leads in passenger earnings per mile of road operated, its figures being \$11,480.46. The Consolidated stands second, with earnings of \$10,477.99. Comparing earnings per train-mile, the position of the two roads is reversed, the New Haven road leading with earnings of \$1,576 per train-mile, while the Boston & Albany is second with \$1,377. The Boston & Maine comes third, its earnings per mile of road operated being \$6,667.48 and per train-mile, \$1,310. The Fitchburg comes next, with earnings of \$5,129.71 per mile operated and \$1,015 per train-mile, and the New England is last, with earnings of \$3,740.29 per mile of road and \$0.976 per train-mile.

All five of these systems carry great numbers of passengers to and from Boston. In fact, almost one-half the entire number transported over all these roads were Boston passengers, and this business decreased nearly three-quarters of a million from the previous year. The Consolidated and the New York & New England roads show each an increase of this traffic. The little narrow-gauge road running between Boston and Lynn carries a good number of passengers, though it is also feeling the effect of electric competition. The new Union station in Boston is a busy place, for the roads that use it carried to and from it no less than 24,689,125 passengers during the year, being an average of nearly 70,000 a day for 365 days. The figures of Boston passengers for all the roads are as follows:

Passengers to and from Boston.			
	1895.	1894.	De-crease.
Boston & Maine.....	20,709,010	21,634,619	925,609
N. Y., N. H. & Hartford.....	14,213,498	13,831,043	*382,455
Boston & Albany.....	7,403,926	7,546,131	142,205
Fitchburg.....	3,983,115	4,054,710	71,595
New York & New England.....	3,493,451	3,426,972	*66,479
Total for standard gauge..	49,793,993	50,513,375	719,177
Boston, Revere Beach & Lynn.....	22,221,923	2,243,126	21,203
Total for all roads.....	52,015,921	52,756,601	740,680

* Increase.

Telegrams of 50 words each can be sent from New York to Chicago at 15 cents each with a good margin of profit; and two large copper wires would be sufficient to transmit all of the letters now carried by mail between those two cities as well as all the telegrams now sent. This is the opinion of Mr. Patrick B. Delaney, an old telegrapher and an ingenious inventor of telegraphic and other electrical machinery, as given in an article on the Future of the Electric Telegraph in the *Engineering Magazine* for October. This result is made possible by recent improvements in automatic chemical telegraphy, by which 3,000 words a minute can be sent between New York and Philadelphia over a copper wire weighing 300 lbs. to the mile. The Chicago estimate referred to is based on a speed of 1,000 words a minute over a wire weighing 850 lbs. to the mile (about ¼ in. in diameter). Mr. Delaney says that thousands of letter writers are

using special delivery stamps to save a half hour at the end of a 24-hour journey, and he naturally concludes that these and many others would be glad to pay three cents more and have the whole journey accomplished in-say, one hour. It is estimated that a 50-word message can be perforated in New York, transmitted automatically, type-written and dropped in the post office in Chicago at an actual labor cost of three cents, to which the cost of the postage stamp must be added; from which it will be seen that the estimate of 15 cents allows 10 cents a message for administration, maintenance, fixed charges and dividends. We do not know how many letters are carried between New York and Chicago daily, but if Mr. Delaney's estimate is made on a basis of 24 hours service a day, he is counting on 57,600 telegrams, which at 10 cents each makes \$5,760 a day. The principle of the chemical telegraph of to-day is the same as that employed by Bain 40 years ago, the discoloration of chemically prepared paper by the electric current, thus making electro magnets and such like movable parts unnecessary at the receiving end. Rapid sending is accomplished by means of the familiar perforating machine which, Mr. Delaney says, has recently been improved. Naturally, he predicts a brilliant future for the telegraph. In large business houses stenographers will take letters as now, but instead of writing them out on the typewriter will transfer them to the paper ribbon by a perforating machine, and the telegraph office will then do nothing but the mechanical process of transmission. At the other end the ribbon containing the dots and dashes will be sent direct to the person to whom the message is addressed who will have it transcribed by a clerk in his own office. It will be seen that this process makes the telegraph practically secret, though we can hardly agree with Mr. Delaney that it is sufficiently so to make cipher codes unnecessary. The author thinks that the ordinary Morse telegraph, as now used, will continue to be the best means of communication where punctuality, accuracy and record are imperative requisites, and that the telephone's thin, piping voice will never buy and sell stocks or wheat to any large extent, or dispatch trains on any busy railroad. The article to which we refer gives some interesting notes of the progress of the telegraph in the past 20 years, or since the British Government took the telegraph into its own hands. The Wheatstone machine, which was early adopted in England, has been gradually improved, until now it carries an enormous traffic in that country at from 100 to 400 words a minute. Between New York and Chicago these machines now transmit, over a duplexed wire, 75 words a minute each way. An automatic repeater is used at Buffalo, as the present wires are not sufficiently good conductors to be worked through. The Wheatstone apparatus is not likely to be farther improved. The prepared paper of the chemical systems is 20 times as sensitive for speed as any electro-magnetic recorder. The faster apparatus is needed for economy. The British post-office telegraph has not paid its way. Low rates will surely be popular wherever introduced. Already Italy, having introduced the Wheatstone apparatus, is about to try the experiment of 5 cent telegrams.

The Atlanta Exposition, some account of which has been given in these columns, is located on one of the main lines of the Southern Railway, and that company, besides making a handsome exhibit, will, like the Illinois Central in the case of the World's Fair of 1893, have occasion to make an extensive practical exhibit of railroad operation in the special arrangements it will have to make to accommodate the passengers and freight going to and from the fair grounds. As already noted in these columns, the line from the city to the fair grounds has been equipped with Hall automatic electric block signals, so as to permit trains to be run at very frequent intervals. Besides this service the company will have a large amount of long distance travel, as it has lines radiating in several directions from Atlanta. The officers of the road inform us that they will be glad to welcome railroad men from all parts of the country, and that officers' private cars will be placed in good positions near the Exposition grounds.

NEW PUBLICATIONS.

Stand Pipe Accidents and Failures. By William D. Pence, C. E., Assistant Professor of Civil Engineering, University of Illinois. 37 illustrations, tables and index; 195 pages, paper. New York: Engineering News Publishing Co., 1895. Price \$1.

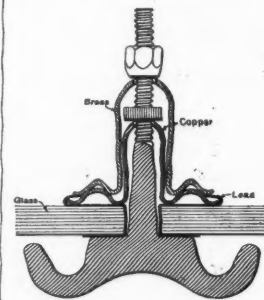
Mr. Pence's little book is intended to be a chronological record of accidents to and failures of water-works stand pipes in the United States, with discussions and assignments of theories, and with a discussion of current practice in specifications for stand pipes and of other related matters. As a collection of failures the volume is valuable. Whether or not the writer's speculations as to causes are valuable is quite a secondary consideration, although presumably they are. The main point is to bring together this mass of information and make it available to the student. We have often quoted Disraeli who in speaking to the students of the University of Glasgow reminded them that the way to succeed is to try, and to fail, and to analyze your failures.

The American Engineer and Railroad Journal, owned, edited and published by Mr. M. N. Forney, at No. 47 Cedar street, New York, is, as all the world knows, a monthly periodical which claims the distinction of being the oldest railroad paper in the world, and which is published at \$3 a year or 25 cents a number. In the October

issue the announcement is made that after Nov. 1 that journal will be published every two weeks, appearing on Thursdays, and that the price will be reduced to \$2.50 a year or 10 cents a number. The amount of reading matter in each issue will be one-half of that which is now published in each of the monthly issues. It is said that some changes in the scope and character of the paper will be announced later, and it is believed that the more frequent publication will make the paper of greater interest to readers and value to advertisers.

The De Forest Method of Glazing.

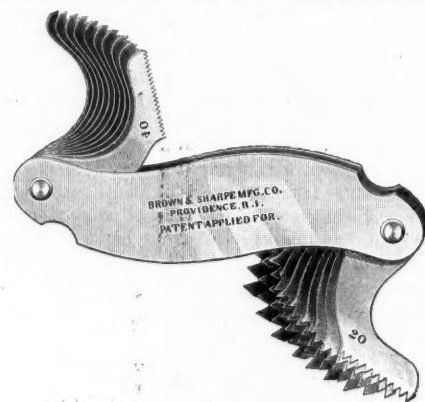
The accompanying engraving gives a sectional view of a method of glazing for skylights, made by the Metallic Glazing Co., 23 South street, New York, and known as the De Forest Patent Glazing System. The bar, which



supports the edges of the glass, is of steel rolled in the form shown. A packing of soft sheet lead is wrapped around the edges of the glass and on this rest the lips of a continuous copper cap. The outer edges of the lead are then turned up over the lips, forming a bead the entire length of the cap. At intervals of eight in., a brass screw 1½ in. high is inserted into the steel bar. This screw has two nuts, the lower one of which fastens the copper cap. Over this is placed a brass spring clip 1½ in. high and 1½ in. long. The second nut is then brought into use and the pressure applied is transmitted by the clip directly to the lips of the cap on each side of the bar, making a tight but not rigid joint. The clip, being of spring metal, is used as an allowance for expansion and contraction of the glass and metal. The company claims that the construction is fire, acid and gas proof, and that it cannot be dislodged by contraction, expansion or vibration. The absence of putty or cement lessens the cost of replacing broken glass. The system is now being applied to the new Y. M. C. A. building in New York city and has also been in successful use for five months on the Secaucus, N. J., car house of the Jersey City, Hoboken & Rutherford Electric road.

A Screw Pitch Gage.

The Brown & Sharpe Manufacturing Company has lately brought out a screw pitch gage, with 20 pitches, which is shown in the engraving. This gage will measure the threads of nuts as well as of screws, and contains the pitches 9, 10, 11, 12, 13, 14, 15, 16, 18, 20 on one end, and 22, 24, 26, 28, 30, 32, 34, 36, 38 and 40 on the other end. The arrangement of gages hinged on each end of the case enables any desired number to be quickly placed in



A Screw Pitch Gage.

position for use. Special attention is invited by the makers to two points which add value to the gage: the fact that the 10 smaller pitches are on blades made narrower than the 10 larger ones, so that they may have a wider range of use in measuring the threads of nuts; and also that the gage numbers are stamped on the outside of the frame, as well as on each blade, allowing the user to determine the position of a desired number at a glance.

The Von Weisenfluh Air Filter.

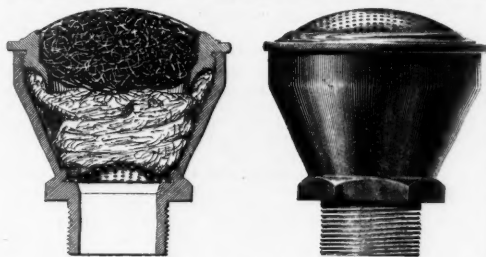
The air filter, shown in the accompanying engravings, has been designed to strain the air taken into the pump of an air-brake, in order that the dust and dirt that would ordinarily be drawn into the cylinder may be kept out, thus preventing cutting and excessive wear. The device has been used on the Delaware, Lackawanna & Western, and on the Delaware & Hudson for some time, and we are told that it has materially increased the life of the pumps.

The filter may be easily attached to an air pump, being screwed directly into the side of the air cylinder. It may be cleaned by removing the perforated top.

As the engraving shows, the air passes first through a perforated cap, then through a packing of hair, and after that, through wool. A second perforated plate serves to

prevent the wool and hair from being drawn into the air cylinder. The shell is made of brass.

The inventor, Mr. Andrew Von Weisenfluh, is one of the oldest engineers in the service of the Delaware, Lackawanna & Western, having been with that road 30 years.



The appliance will be made by the Von Weisenfluh Air-Filter Co., of Scranton, Pa., which has a capital stock of \$30,000.

The Verona Track Jack.

The illustrations show a new track jack, made by the well-known Verona Tool Works, of Pittsburgh, Pa. It weighs 51 lbs. and has a capacity of 10 tons. The height of bar when down is 21 in. and the lift of the rack bar is 14 in. The frame of the jack is made of malleable iron,

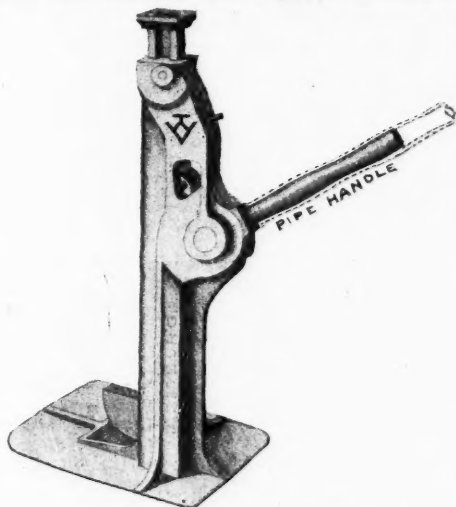


Fig. 1.—The Verona Track Jack.

while all other parts are of crucible steel. The size of the base of the jack is 7 x 12 in., the dimensions recommended by the Roadmasters' Association. The load may be instantly dropped by means of the lower pawl and can be let down one tooth at a time if so desired. The lifting lever serves as a handle by which the jack may be carried, in addition to its other use. The engravings

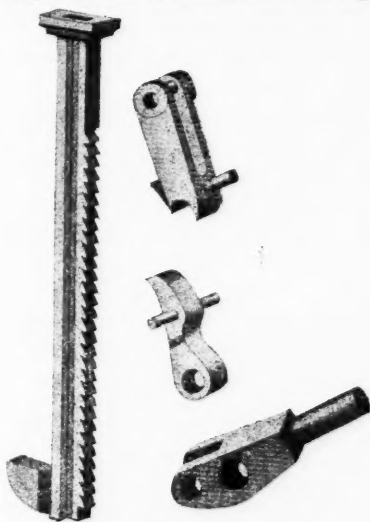


Fig. 2.—Parts of Verona Track Jack.

show the jack assembled and also the parts. In Fig. 2 B is the rack bar; D, the top catch, hung from the frame of the jack; E, the lower pawl, which is pivoted to and raised by the lever C. The top catch holds the rack bar while the pawl E is depressed for another stroke. As is seen, the parts are few and large.

TECHNICAL.

Manufacturing and Business.

The Berlin Bridge Co. has lately completed a new store-room for the Hartford Rubber Works, a new car house for the Norwalk Tramway Co., at South Norwalk, Conn., and a new generator house for the Burlington Gas Light Co., at Burlington, Vt. The company is busy in all departments.

The National Paint Works at Williamsport, Pa., received a large order from the War Department at Washington last week. The company has also taken the con-

tract for furnishing paint for the bridge across the Missouri River at Sioux City, Ia.

The Peerless Rubber Manufacturing Co. has opened an office in the Old Colony Building, Chicago, which will be in charge of Mr. H. W. d'Evers, General Sales Agent of the company. A large stock of the company's goods, including air-brake, steam and water hose, gas jets, etc., will be kept on hand in a warehouse on the north side of the city.

The 500 new cars which are to be built for the Grand Trunk road by the Pullman Car Co. are to be equipped with the Monarch brakebeam and the second 500 being built by the Michigan-Penninsular Car Co. will have the National hollow brakebeam.

Articles of incorporation have been filed in New Jersey by the Pancoast Car Mfg. Co. The corporation is to build ventilated fruit cars under the Pancoast patents. The capital stock of the company is \$500,000, and the amount paid in is said to be \$10,000. The incorporators are Richard M. Pancoast, Camden; James D. Wilson, A. Judson Griffith and Joseph C. Henvis, of Philadelphia.

The General Railway Equipment Co., of Chicago, has been formed by Harlow N. Higinbotham, Eliphalet W. Cramer, James H. Long and Harry N. Higinbotham.

The New York, New Haven & Hartford has recently added two more automatic railways of the Hunt type to the number already in use.

The Duluth, Missabe & Northern has specifications for 200 ore cars in the hands of builders, but will probably let contracts for a larger number.

Iron and Steel.

Press reports state that furnace No. 1, of the Illinois Steel Company, at Joliet, will be started in the near future. This company has of late tried the "tag and clock" system in timing its employees. There is considerable objection to this among the men, and there is some danger of a strike. As there are about 10,000 men employed at the various plants of the company, such a strike would be a serious one.

The Pennsylvania Steel Company has closed its transfer books for the purpose of making up the interest accounts on the new preferred stock for the past six months, and to prepare the new stock certificates of the reorganized company. Interest at the rate of five per cent. per annum will be paid on the preferred stock receipts which were paid up in full when they were issued in June last. After Oct. 15 the preferred stock will participate in the earnings of the company up to seven per cent. per annum, non-cumulative.

It is reported that the Crum Creek Iron Works in Ridley Township, near Chester, Pa., have been sold to a New York syndicate.

It is reported that the Bethlehem Iron Co., has made another shipment of armor plate for the Russian battle ship Sebastopol.

At the regular meeting of the freight department of the Central Traffic roads in Chicago, held Oct. 3, it was agreed to advance the rates on pig iron and billets 10 cents a ton between the Buffalo and Pittsburgh territory and Chicago and other points in proportion. It was also agreed to advance the rate on scrap iron between Chicago and the Ohio River to \$1.75 a ton, and on pig iron between the same points to \$1.70 a ton.

Water Power Development on the Potomac.

The recent completion of the long distance transmission plant at Portland, Or., reminds us of the scheme now being agitated to supply the cities of Baltimore and Washington with electric power, generated at the Great Falls of the Potomac, 15 miles above Washington, and 40 miles distant from Baltimore. Primarily, however, the installation would be made to supply Washington, the extension to Baltimore being proposed on account of the large amount of power available. Mr. J. P. Frizell, of Baltimore, who is Chief Engineer of the company which proposes to utilize the power of the Falls, estimates that 35,000 H. P. could be obtained for all but three months in the year, during the dry season, at which time it is proposed to supplement the water power with steam. Ten thousand horse power could be obtained all the year round. The plan includes a dam across the river near the present government dam and sixteen 1,500 H. P. turbine wheels.

Testing the Pennsylvania's Dynamometer Car.

The dynamometer car of the Pennsylvania Railroad is this week at the Engineering Laboratory at Purdue University, where its weighing mechanism is being checked by comparison with the Emery testing machine, which constitutes the traction dynamometer in Purdue's locomotive laboratory. This car was sent on from Altoona in the charge of Mr. Goodfellow, and was switched directly to the laboratory. The results of this comparison have not yet been given out.

Foot Guards.

A copy of the following letter sent by the State Railroad Commissioner to the executive officers of all the railroads operating in the state of Ohio:

"Your attention is called to the provisions of the . . . Revised Statutes of Ohio, 'An Act for the Protection of Railroad Employees.'

"The present mode of blocking with wooden blocks, cinders, etc., is very unsatisfactory, but has been tolerated in the absence of a better plan. There are now metal devices which will effectually block frogs, switches and guard-rails, and if durability and safety

are considered, are no more expensive than the present system. It is my duty to see that the law is carried out, so far as the roads operating in this state are concerned, and I will consider the use of the 'National Railway Foot Guard' or the 'Green Guard' or devices equally as good, as complying with the law."

Car Lighting.

The Atchison, Topeka & Santa Fe Railroad is equipping 25 passenger cars with Pintsch lights, which will be used in the through trains from Chicago to the Coast. It is the intention of the Atchison Company to apply the Pintsch light to all of its cars as fast as circumstances will permit.

Bids for Steel Forgings Opened.

Bids were opened at the Navy Department on Oct. 3 for supplying 13 sets of steel forgings for 5-in. rifles and 27 sets of forgings for 4-in. rifles. The bids were as follows: Bethlehem Iron Company, of Pennsylvania, for the 5-in. forgings, 29 cents per pound, deliveries to begin in 90 days and be completed in 150 days; 4-in., 29 cents per pound, deliveries to begin in 120 days and be completed in 150 days. Midvale Steel Company, of Pennsylvania, for the 5-in. forgings 30 cents per pound, deliveries to begin in 100 days and be completed in 175 days; 4-in., 28½ cents per pound, deliveries to begin in 100 days and be completed in 175 days.

Trial Trip of the St. Paul.

The steamship St. Paul, built for the International Navigation Co. by the Cramps, made an official trial trip off the coast of Massachusetts on October 4. An average speed of 20.5 knots an hour was maintained over an 88 knot course. No serious trouble was experienced with the machinery during the trip. The official trip was made by the government officials to determine the eligibility of the vessel as a United States mail carrier, and as an auxiliary cruiser in time of war. A speed of 20 knots an hour for four consecutive hours is required.

The Iron and Steel Market.

The most interesting recent bit of news in the iron trade is the report of an order from the Carnegie Steel Co. for 20,000 tons of Alabama low silicon iron, which report, if true, has a significance that cannot easily be overestimated. The story is that the Carnegie Company has tried 5,000 tons of iron made from the common red iron ore of the Birmingham district where it exists in immense quantities, with the result that the possibility of using the ore commercially for basic open hearth steel is demonstrated beyond a doubt. If this report be true, the benefit to the Birmingham district and to the roads tapping that region should be enormous. Later reports are to the effect that the Jones & Laughlin Co., of Pittsburgh, has also used the Alabama iron with success in its basic furnaces, and that orders for further supplies of the same have been placed with the Tennessee Coal & Iron Co., who supplied the Carnegies.

Prices of pig iron are steady, with no immediate probability of any change in the situation. The fact that most of the furnaces are well sold up for the balance of the year makes the matter of immediate prices of small consequence. The increase in cost of production is almost equivalent to the increase in prices, so that without a decrease in the former item there is not likely to be a great decrease in the latter. The recent advance in cokemakers' wages has had a steadying effect on the market.

While prices of structural and other steel are in some cases lower there has been considerable activity in the rail market. The placing last week of orders for considerably over 100,000 tons of rails is reported. These orders include rails for delivery from December well into the early part of 1896. The annual order of the Pennsylvania for 40,000 tons was parcelled out among the Illinois, Cambria, Pennsylvania and Carnegie companies. There were also orders for 25,000 tons from a southwestern railroad and 20,000 tons from the Baltimore & Ohio. It is understood that the prices were on a basis of \$28 per ton f. o. b. Pennsylvania mills, and \$29 f. o. b. at Chicago. The Steel Rail Association having fixed its price at \$28 for the coming year, there would seem to be no advantage to purchasers in delaying, which makes it seem probable that orders for rails for deferred renewals and for new construction should cause considerable further activity in this direction in the near future.

THE SCRAP HEAP.

Notes.

The dining cars on the Pennsylvania lines west of Pittsburgh are now owned and operated by the railroad company.

The Brooklyn Elevated Railroad has restored to the locomotive engineers the 10 per cent. taken off from their wages two years ago.

The Toledo, St. Louis & Kansas City now uses electric headlights, of the National Company, on its night passenger trains. Four locomotives are equipped.

The drought in the region of Altoona, Pa., is so severe, that the Pennsylvania Railroad Company is drawing 11 trainloads of water daily to that city from Hollidaysburg, which is the only town for miles around that has water to spare.

A commission has been appointed by the Superior Court at Boston to supervise the separation of grades at a number of important street crossings over the Boston & Maine, in the Charlestown district of Boston, and it is said that the plans, which have already been prepared

by the engineers of the railroad, will be carried out as soon as possible. The principal points affected are Prison Point, Main street, Rutherford avenue and Cambridge and Perkins streets. The total estimated cost of the proposed improvements is over one million dollars. The Commissioners are: Hon. H. S. Milton, of Waltham; Hon. H. G. Taft, of Uxbridge, and Hon. E. E. Bishop, of Haverhill.

Three train robberies have been reported during the past week. Near Casto, I. T., on the night of the 6th, an express car was robbed in a business-like manner, but, according to the reports, the robbers secured only 85 cents. Near Kalamazoo, Mich., on the next night, shots were fired at a passenger train of the Grand Rapids & Indiana, but the engineman did not stop. In one of the wildernesses in the outskirts of Chicago, on the night of the 7th, an electric street car was held up by five masked robbers, who made the passengers give up their valuables. The robbers cut the wires so as to prevent other cars approaching. A passenger who attempted to resist was wounded by his own pistol.

A Bridge Accident.

The bridge of the Louisville & Nashville at the Rigolts, near New Orleans, which was knocked down by a schooner recently, was a Whipple through iron span 107 ft. long, built by the Phoenix Bridge Co., in 1876. The draw was open, but the schooner, heavily loaded, was insufficiently manned and the crew lost control of her as she approached the bridge. The boom seems to have struck one of the posts, knocking it out of the cast-iron joint box, thus causing the collapse.

Erie Canal Improvement.

At the last monthly meeting of the New York Chamber of Commerce the following resolution was passed:

That this Chamber approves of the proposition to permit the issue of bonds by the state, to the amount not to exceed \$9,000,000, to be expended for the purpose of enlarging and improving the Erie, Champlain and Oswego canals, and earnestly urges upon our citizens to cast their votes, at the coming election, in favor of the measure.

The Great Fire at Warren.

The great fire at Warren, R. I., Oct. 3, consuming the cotton mills of the Warren Manufacturing Co., and causing an estimated loss of \$1,125,000, was due to the combustion of the wooden lagging of the high-pressure cylinder of a compound steam engine working under 120 lbs. pressure. This statement is made by Mr. Edward Atkinson, President of the Manufacturers' Mutual Insurance Co., in a circular urging the more general use of automatic sprinklers as a protection against fire. The mills were mostly equipped with the sprinklers, but the room in which the fire began was not. The fire gained such headway that, even with the help sent from Fall River, Bristol and Providence, it was impossible to get it under control. The three mills destroyed were each 700 ft. long, five stories high, and contained in all 78,000 spindles, employing about 1,600 operators.

Recent Statistics of a Road Operating by Cable, Horses and Electricity.

The following interesting comparative statistics are taken from the annual report of a company which is now operating about 12 miles of its roadway by the cable system, about five miles by horses and about six miles by electricity, a total of about 23 miles of road (47 miles of track). The road carries between 12,000,000 and 15,000,000 passengers per annum.—*Street Railway Journal*.

	Car Mileage.		
	Cable.	Horse.	Electric.
1890.....	4,606,294	678,953	437,108
1891.....	4,484,713	611,026	416,292
1892.....	4,281,123	550,181	402,677
1893.....	3,556,298	496,014	445,975
1894.....	3,974,336	472,035	571,823

	Operating Expenses per Car Mile.		
	Cable.	Horse.	Electric.
1890.....	\$.095	\$.109	\$.115
1891.....	.085	.112	.109
1892.....	.083	.110	.096
1893.....	.091	.107	.097
1894.....	.080	.112	.092

A Ship Canal to Berlin.

The news came the other day that the proposal to build a ship canal to Berlin and thus constitute the German capital into a port has assumed a more substantial shape. The scheme which receives the most general support will involve an expenditure of about \$10,000,000, and it is being seriously considered by the authorities. This sum would provide for the construction of a canal 70 ft. wide on the bottom and 190 ft. at the surface, with a depth of 25 ft. The waterway would pass through Lubars, Schildow, Mühlenbeck, Baseldorf, Wandlitz, Klosterfelde, Larke, and Ruhlsdorf to the Finow Canal. No locks are necessary down to this point, the same levels obtaining. Crossing this canal the course of the proposed waterway would be via Grafenbrück, Steinfurth, Lichterfelde, and Eberswald. Here two locks would be required. At Port Leife and Oderberg the Finow Canal is entered, but is left again at Hohensaathen Wehr, and it then runs down on the left bank of the River Oder, passing Schwede, Gaton, and Garz, entering the River Oder at Griefenhagen. In this reach a lock is necessary. The course of the river is then followed to Stettin, and vessels would leave by Swinemünde, proceeding to Kiel, and pass through into the North Sea by the North Sea Canal. The Tegel Lake, west of Berlin, is to be made the harbor, and between that and the city will be the site for warehouses.—*Transport*.

A Bridge for the Paris Exposition.

There is still another attraction in store for the visitors to the Universal Exhibition of 1900. M. Hulhard, who is intimately associated with the enterprise, which is practically to turn one-half of Paris into a vast fair, proposes to throw across the river between the Champs Elysees and the Esplanades des Invalides an exact reproduction of "Old Change Bridge." The antique "Pont au Change" which connected the Chatelet with the city must not be confounded with the new one, built in 1858. There are numerous drawings, engravings and paintings of the old bridge, so that its reconstruction could be accurately effected if the 10,000,000 francs necessary for the work can be raised. M. Hulhard hopes to obtain the support of all the leading financiers and bankers in realizing his project, the expense of which would be covered, and more, by gate money during the exhibition. If carried out, as intended, the exhibitional

Pont au Change will form a visible epitome of the history of the worship of the Golden Calf in France.—*Boston Herald*.

Traffic on the Kiel Canal.

In August 718 vessels, together about 115,688 tons, passed through the Baltic Canal, as against 500 vessels, with 74,000 tonnage in July. This increase, however, is entirely accounted for by the canal being opened for vessels with a draught of 6½ meters. Of vessels over 100 tons register there were 255, and of these 60 per cent sailed to or from Hamburg. According to the report of the Stettin Chamber of Commerce, the traffic in the canal has hitherto fallen far below the expectations. The main reason of this is the high scale of charges and also the small saving of time as the nights grow longer. The electric lighting of the banks of the canal has not proved a complete success, and only the smaller craft can safely pass through by night. Under these circumstances the report says that the canal is only profitable for the smaller craft, and only for such as ply between Kiel and Hamburg. Owing to the night passage being impracticable, the canal route in most cases involves serious disadvantages. The report recommends that the contemplated higher winter tariffs should not be enforced.

British Coal Production in 1894.

A blue book issued recently gives the mineral statistics of the United Kingdom of Great Britain and Ireland for the year 1894. From this return it appears that during the twelve months covered by the report the total production of coal from the whole of the collieries of the kingdom amounted to 188,272,525 tons, as compared with 164,325,795 tons in 1893. The value of this produce at the mines was estimated at £63,730,179, giving an approximate price per ton at the pit's mouth of 6s. 7.43d. per ton, which is rather below the value of the preceding year, when the price per ton was 6s. 9.52d. Of the total the English mines contributed 138,327,414 tons of the value of £45,523,978, being 6s. 6.98d. per ton; the Welsh collieries yielded 28,355,953 tons, which were valued at £10,659,583, or 7s. 6.32d. per ton; while from the coal pits of Scotland the gross output was 21,481,554 tons, of the value of £6,497,687, or 6s. 0.6d. per ton. Coal mining in Ireland, as is well known, is not extensive, but coal has a better value in that country than in any other part of the United Kingdom. Only 112,604 tons were produced, the value of which at the pit's mouth was £48,931, which gives an approximate price per ton of 8s. 8.23d.

LOCOMOTIVE BUILDING.

The Juniata shops of the Pennsylvania Railroad Company at Altoona have an order for 25 class "P" passenger engines.

The Receiver of the Ohio Southern road has recently applied to the Court having jurisdiction of the Receivership for authority to purchase additional engines for the road. The Court has not yet taken any action on this application, and the number to be purchased will, of course, depend upon the order of the Court.

CAR BUILDING.

The New York, Ontario & Western has issued specifications for building 500 coal cars.

The New York, New Haven & Hartford is reported in the market for building 1,000 freight cars. The larger number of these cars will be box and the other part of the order will be for coal cars.

The Pennsylvania has just ordered the construction of 500 gondola cars at the company's shops at Altoona, Pa. It is said that an additional order for 500 cars will be given to car building companies. The company has just turned out of the Altoona shops 77 dairy refrigerator cars, and in connection with the gondola cars, has ordered 75 more dairy cars.

The Pullman Car Co. has an order from the Calumet & Blue Island road, one of the Illinois Steel Co.'s lines, for building 100 platform and 50 hopper-bottom coal cars. The company also has an order for 350 80,000-lb. cars for the Pennsylvania. About 300 of the 1,000 Philadelphia & Reading cars, ordered early in the year, have been delivered.

BRIDGE BUILDING.

Abbeville, La.—The police jury on Oct. 3 condemned the bridge across bayou Vermilion, and instructed the bridgekeeper to post notices to that effect, warning people with teams and load of danger. The bridge committee was empowered to purchase a ferryboat to be used until a new bridge can be erected. Bids will be advertised for immediately.

Baltimore, Md.—The South Baltimore Business Men's Association held a meeting on Oct. 2, and appointed Dr. R. C. Lee, William Bone and Henry J. Broening a committee to visit the Southwest Baltimore Business Men's Association and ask co-operation in urging the completion of the Barre street bridge over the Belt Railroad.

Bridgeton, Pa.—The Cumberland County Board of Freeholders on Oct. 3 opened 10 bids for the construction of a new bridge across the Cohansey at Broad street. The Cox & Son Company, of Bridgeton, was the lowest bidder, at \$14,746.

Chicago.—Secretary Lamont has approved plans submitted for the construction of a bridge over the North Branch of the Chicago River at the foot of North Halsted street.

Cleveland, O.—It is said that the South Rocky River bridge, on the line of the Cleveland & Elyria Electric road, will soon be ready for use. The bridge is a viaduct about 130 ft. above the river and somewhat over 1,000 ft. long. Its longest span is 162 ft., and there are six of 108 ft. each and a number of shorter ones.

Fairport, N. Y.—Mr. George H. Aldridge, Superintendent of Public Works, Albany, N. Y., writes us that the contract for a wrought iron bridge over the Erie Canal at Main street was awarded on the 4th of October to the Rochester Bridge & Iron Works, of Rochester, N. Y., the contract price being \$7,796.

Fargo, N. D.—Press reports state that the Great Northern will build a steel bridge across the Red River between Fargo and Moorhead during the coming winter. It is to cost \$80,000.

Galveston, Tex.—The new bridge of the Gulf, Colorado & Santa Fe, across the West Bay, was completed and tested on Oct. 2 and the regular passage of trains across it will begin at once.

Hadley, N. Y.—The Berlin Iron Bridge Co. has just completed for the town a bridge 300 ft. long and 16 ft. wide.

Houston, Tex.—At a meeting of the City Council, held Oct. 7, the question of erecting a bridge at Hill street across the Buffalo Bayou, to connect the second and fifth wards, was again brought up. This matter has been agitated for the past ten years, and it seems probable that it will now be built.

Indiana polis, Ind.—The matter in dispute between the Board of County Commissioners and the Big Four Railway Company pertinent to the building of a new bridge and viaduct in place of the old, caved-in Prospect street tunnel has been finally settled so far as the Commissioners are concerned. At a consultation, held recently, the Commissioners agreed to pay \$7,500 toward the expense of the new structure, the total cost of which it is estimated will approach \$15,000. There will be a straightening of Prospect street, and the roadway will be widened to 38 ft. The construction of the new viaduct upon the plans adopted, it is claimed, will necessitate the building of a new bridge to cross Pleasant run on the new roadway which has been opened. The iron bridge already spanning the run will be removed to some other crossing.

Niagara Falls, N. Y.—The Common Council, on Oct. 8, approved the recommendation of the Board of Public Works that the contract for constructing the new bridge across the hydraulic canal at Second street be let to the Wrought Iron Bridge Company, of Canton, O., at its bid of \$9,423.25.

San Antonio, Pa.—The City Engineer has been authorized to prepare plans for an iron bridge at Eighth avenue.

Sioux City, Iowa.—Rapid progress is reported upon the bridge across the Missouri at this place, and it is estimated that the trains of the Pacific Short Line will be running over the bridge before the 1st of December. Part of the false work is now being removed.

St. Louis.—The project of constructing a free bridge across the Mississippi River at St. Louis has again been revived. At a recent meeting of the St. Louis Manufacturers' Association resolutions were proposed whereby a tax of one-fourth of one per cent. was to be levied upon the city for 10 years for constructing a free bridge and terminals, so as to get better rates for eastbound passengers and freight, said bridge to remain city property forever. The resolutions were referred to the railroad committee.

Stockton, Cal.—It is reported that the Southern Pacific has commenced work on its new drawbridge across the San Joaquin River, near Lathrop. A temporary track has been laid around the old bridge, which will be moved to the west of its present location while the new one is being constructed.

Vicksburg, Miss.—The large bridge which has just been completed over Black River, east of this city, for the Queen & Crescent, has just been put into service. The length of this bridge is about 300 ft., although there are long approaches.

Worthington, Minn.—The bids received on Sept. 24 for a steel bridge were opened and the contract awarded to S. M. Hewett & Co., of Minneapolis, Minn.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlantic Coast Line, 1½ per cent. payable Oct. 10.

Boston & Providence, quarterly, 2½ per cent. payable Oct. 1.

Central of New Jersey, 1½ per cent. payable Nov. 1.

Detroit & Mackinac, annual, Alpena, Mich., Oct. 29.

Northern of New Hampshire, quarterly, 1½ per cent. payable Oct. 1.

Sioux City & Pacific, 3½ per cent. on the preferred stock, payable Oct. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chesapeake & Ohio, annual, Richmond, Va., Oct. 22.

Chicago Junction Railways and Union Stock Yards Co., annual, Jersey City, N. J., Nov. 14.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 30.

Illinois Central, annual, Chicago, Oct. 16, also a special, Chicago, Nov. 26 to authorize a capital of \$10,000,000 for the capital stock.

Manhattan Railway Company, annual, New York City, Nov. 13.

New Orleans & North Eastern, annual, New Orleans, Nov. 6.

New York, New Haven & Hartford, annual, New Haven, Conn., Oct. 16.

Northern Pacific, annual, 85 Wall street, New York City, Oct. 17.

St. Louis & San Francisco, annual, St. Louis, Mo., Oct. 29.

Toledo & Ohio Central, Toledo, O., Oct. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Railroad Superintendents will hold its annual meeting at Hotel Brunswick, New York City, on Monday, Oct. 14, at 10:30 a. m.

The American International Association of Railroad Superintendents of Bridges and Buildings will hold its annual meeting at New Orleans, La., Oct. 15.

The American Street Railway Association will hold its annual meeting at the Windsor Hotel, Montreal, Oct. 15 to 18.

The Roadmaster's Association of America will hold its annual meeting at St. Louis, Mo., Oct. 15, 16 and 17.

The American Railway Association will hold its fall meeting at New York City, Oct. 16.

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Wesleyan

Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Cleveland Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2.30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

American Railway Association.

The fall meeting of this association will be held at the Hotel Brunswick, New York City, on Wednesday, Oct. 16. Reports will be presented by the committee on train rules; committee on car service; committee on safety appliances; joint committee on interlocking and block signals; committee on general regulations for employees; committee on the international railway congress and committee on standard wheel and track gages. Three members of the committee on car service and three members of the committee on safety appliances are to be elected.

Western Foundrymen's Association.

The next meeting of the Association will take place at the Great Northern Hotel, Chicago, at 7.30 p. m., Wednesday, Oct. 16. A paper will be read by Mr. James S. Brady entitled "The Modern Jobbing Foundry." The discussion on the paper read by Mr. A. S. Sarge, Jr., M. E., on "An Example of Cost Sheets for Foundries," at the last meeting, will be continued.

An invitation has been received from the Foundrymen's Association, of Philadelphia, to join in the National Convention of Foundrymen to be held in Philadelphia in November or December. This invitation will be discussed and a decision in the matter will be arrived at at the next meeting.

Road Masters' Association of America.

As before announced, the thirteenth annual convention of this association will be held in hall of Southern Hotel, St. Louis, Mo., on Oct. 15, 16 and 17 next.

There will be reports read on the following subjects:

Joint Fastenings, by J. W. Wright, Chairman.

The Advantages of Increasing the Lengths of Rails and Using Miter Joints, by R. Caffrey, Chairman.

Hollow Ties, and the Injury Cause by the Same to Split Switches, Spring Rail and Rigid Frogs, by J. B. Dickson, Chairman.

Preservation of Ties, by M. Riddle, Chairman.

Track Records, by Charles S. Churchill, Chairman.

Standard Track Tools, by G. W. Merrell, Chairman.

Papers will be read on the following subjects:

Methods for Providing for Expansion in Long Connection Rods to Derails and Split Switches, by J. A. Kerwin.

The Relative Gage of Car Wheels and Track and the Flangeway of Guard Rails, by C. E. Jones.

The Committee of Arrangements, of which Mr. C. E. Jones is Chairman, have provided a working programme as follows: St. Louis, Oct. 15, 1895, organization and session at 10.30 a. m.; address of welcome by Mayor Walbridge; reply by President Black; regular business, 2 p. m., afternoon session.

Wednesday, Oct. 16, two sessions. At 8 p. m. the Southern Hotel will serve a dinner for the special pleasure of the roadmasters and friends who are guests of

the hotel without extra charge; reception immediately after.

Thursday, Oct. 17, two sessions, and evening session if necessary to finish business.

Arrangements have been made for a trip on Friday.

Engineers' Club of St. Louis.

At the meeting of Oct. 2, 1895, 36 members and 12 visitors were present.

The President announced the death of Alex. E. Abend, and stated that Mr. Edward Flad had consented to prepare a memorial for presentation at an early meeting.

On behalf of the committee, Mr. Robert Moore then presented to the club the oil portrait of Col. Henry Flad, President of the club for the first 12 years of its existence. Mr. Moore explained the steps which had been taken to secure the portrait, which was the work of Mr. Chas. F. Von Saltza, of the St. Louis School of Fine Arts. Mr. Moore called attention to Colonel Flad's long and honorable career.

Mr. Richard McCulloch then read a paper on "The Continuous Rail in Street Railway Service." He described briefly the work done in St. Louis and elsewhere, and the processes employed. The paper was illustrated by drawings, photographs, rail sections, and samples of joints. Two systems had been employed in St. Louis, electric welding, and cast welding; the latter, requiring a less expensive plant, being simpler and easier to operate, and the work appearing to stand service better, had been given the preference. In spite of the extreme temperatures but a very small percentage of the joints had broken, and these were clearly due to defective welds. The cost was not greatly in excess of the old fish-plate method. It was thought that the rail being surrounded by earth or paving on all sides except the top it was protected from the extreme variations of temperature and being held rigidly in position, these two features tended to counteract the expansion and contraction which would ordinarily be expected.

The discussion was quite general, being participated in by Messrs. Bruner, Crosby, Hermann, Ockerson, Wheeler, Moore, Captain McCulloch, Winslow, Laird, Baier, A. L. and J. B. Johnson, Sterne, Perkins, Flad, Professor Nipher and President Russell.

American Institute of Mining Engineers.

The fall meeting of this society began at Atlanta, Ga., on Tuesday of this week. The afternoon of that day, Oct. 8, was to be given up to a visit of Exposition, the opening session being held on Tuesday evening. On Wednesday there were morning and evening sessions and a morning session on Thursday. The latter day was Mining Engineers' day at the Exposition. On Friday and Saturday visits will be made to the granite and marble quarries in Northern Georgia, and Saturday evening the members will start for Chattanooga where Sunday and Monday will be spent. A stop will also be made at Asheville on Tuesday, Washington being reached on Wednesday. The Southern Railway provided a special train for the members and guests of the Institute from Washington to Atlanta, starting from Washington on Monday, Oct. 7, at 7 p. m. The return trip will be made by Chattanooga and Asheville as stated above, the train reaching Washington on its return on Wednesday evening, Oct. 16. The Southern Railway will make no charge to delegates for transportation on this special train. Members going by other trains can secure a rate to Atlanta and return, for 10 per cent. above the price of one through fare.

The following is a list of some of the papers to be read at this meeting: Present Development in Gold Mining in the South Appalachian States, H. B. C. Nitze and H. A. Wilkins; Mineral Resources Northern Georgia and Western Northern Carolina, W. P. Blake; Southern Magnetites, Harvey S. Chase; Phosphates and Marls of Alabama, Eugene A. Smith; Southern Pyrites, W. H. Adams; Precious Stones of the South, Geo. F. Kunz; Chrome in South Appalachian Regions, Wm. Glenn; Eastern Coal Region of Kentucky, Graham Macfarlane; Utilization of Southern Iron Ores in Blast Furnaces, J. Birkinbine; Comparison of Recent Phosphorous Determinations in Steel, Geo. E. Thackray; Magn. Separation of Iron Ore, C. M. Ball; Steel Rail Specifications, R. W. Hunt; Biographical Notes on E. B. Cox and Franz Posepny; Physics of Cast Iron, Committee report.

PERSONAL.

—Mr. A. C. Wheeler, Superintendent of Terminals on the Texas & Pacific road, died last week in El Paso, Tex.

—Mr. James Seath, President of the Terre Haute Car Manufacturing Co., died at his home in Terre Haute on Oct. 5, after a brief illness, aged 68 years.

—Mr. L. W. Richards has resigned as Superintendent of the American Steel Casting plant at Sharon, Pa., to accept a similar position at Columbia, Pa. A number of changes have been made at the Sharon plant.

—Mr. Marcellus Hopkins, President of the Chicago & South Side Rapid Transit road, was last week appointed Receiver of that property in the foreclosure proceedings brought by the first and second mortgage bonds.

—Mr. Richard Carroll, General Manager of the Queen & Crescent line, having resigned that office, the position was abolished on Oct. 1, when the lines below Meridian were separated from the other Queen & Crescent line.

—Mr. Richard R. Metheny, recently appointed Secretary and Auditor of the Grand Rapids & Indiana road, has been in the Auditor's office for many years, and in the company's service altogether about 25 years, starting as clerk.

—Mr. C. J. Smith, who has just been appointed Receiver of the Oregon Improvement Co., is General Manager of the company, and has held that office for several years under the various managements which the company has had.

—Mr. D. F. Jack, formerly assistant to President H. F. Plant, has been appointed Vice-President of the Plant railroad and steamship lines. His headquarters will be in New York City for one-half of the year and at Tampa Bay the other half.

—Mr. Gilbert W. Ledlie, Auditor of the Flint & Pere Marquette road dropped dead in Saginaw, Mich., Friday evening last from heart trouble. He had been auditor of the company for 30 years. During the war he was quartermaster of a New York regiment.

—Mr. George W. Dickinson, Assistant General Superintendent of the Northern Pacific, is named by Receiver Burleigh as General Manager of that portion of the road within his jurisdiction as Receiver, the portion extending from the Pacific Coast to the North Dakota line.

—Mr. Robert A. Parke has been appointed General Agent of the Seaboard Air Line, with headquarters at Washington, D. C. Mr. Parke resigns from the Pennsylv-

vania, of which he has been Southwestern Passenger Agent at Washington for some years, to accept this new appointment.

—Mr. Pomeroy P. Dickinson, a civil engineer of New York, died in that city on Oct. 4. Mr. Dickinson had an office in New York for many years as Consulting Engineer, and did a good deal of work in railroad construction, his most recent work of this nature being as Chief Engineer of the connecting railroads of the Poughkeepsie bridge on both sides of the Hudson River.

—Mr. H. F. Baldwin, recently Chief Engineer of the Chicago, Peoria & St. Louis road in Illinois, has been appointed Engineer of Maintenance of Way of the New York, Lake Erie & Western. His office is to be at Jersey City. The Erie has heretofore had a General Roadmaster, but that office has now been abolished and Mr. S. R. Johnston, who has held the position, becomes General Tie Agent.

—Mr. Charles Hine, lately Lieutenant in the Sixth United States Infantry, who went to work on the Cleveland, Cincinnati, Chicago & St. Louis about six months ago in order to learn the art of railroading and work-up, has already been promoted. He began as a freight brakeman where he earned \$60 a month, but now he is a passenger brakeman running to and from Louisville, and earning \$45 a month.

—Dr. J. G. Pohl, inventor of the Pohl air lift pump, died in New York, Oct. 7. He was born in Berlin in 1829. The ingenious scheme for lifting water by forcing air under it (now known as the Pohl air lift pump) occurred to him about 12 years ago while he was managing a silver mine in Colorado. Dr. Pohl was a man of considerable scientific attainments and distinction, having been at one time State theologian of New York.

—Mr. A. S. Dunham has recently been appointed General Manager of the Ohio Southern road. This appointment has just been announced by the new Receiver of the company, Mr. J. R. Megrue. Mr. Dunham was formerly connected with the operating department of the Southern Railway. He recently made an inspection of the property for the Bondholders' Committee, which is said to have asked for his appointment as General Manager.

—Mr. William B. Thomas has been appointed Commissioner of the Southern States Passenger Association, and entered upon the duties of the office Oct. 1, on the retirement of Mr. Finley. Mr. Thomas was formerly General Manager of the Augusta Southern, and subsequently was Receiver of the Atlanta & Florida. When the latter road came under the control of the Southern Railway he was made Division Superintendent.

—Mr. William Metcalf, the well-known steel maker of Pittsburgh, has opened an office in that city as Consulting Engineer in all matters pertaining to iron and steel manufacture. Mr. Metcalf is acknowledged to have an almost unrivalled fund of information as to steel working, gathered in an experience of over 37 years in that business. He is a Past President of the American Society of Civil Engineers and also of the American Institute of Mining Engineers.

—Mr. Andrew F. Burleigh, the new Receiver of the Northern Pacific, appointed by Judge Hanford, of the Washington Circuit, is a lawyer, and for the past few years has been General Counsel of the Oregon Improvement Co., which office he will now resign. He was formerly local counsel of the Northern Pacific at Seattle, holding that office about six years until his appointment in 1892 as Counsel of the Oregon Improvement Co. Mr. Burleigh formerly resided in Montana and Dakota, and was educated in the West, but was born in Pennsylvania. He is now about 37 years old.

—Mr. O. M. Stimson, who for the last five years has been with the Pullman Company, and previous to that time for seven years with the Lafayette Car Works, has been appointed General Superintendent of the southern shops of the United States Car Company, including Decatur and Anniston, to take effect Oct. 1; office at Anniston. It is the intention to start the Anniston car shop, forge, rolling mill and machine shop, giving special attention to jobbing work, axles, heavy shafting, etc. The forge has capacity for shafting up to 12-in. diameter.

—Mr. J. T. Mahl has been appointed Engineer of Maintenance of Way of the Texas lines of the Southern Pacific, the Galveston, Harrisburgh & San Antonio and the Texas & New Orleans. This is a new office on the Atlantic System of the Southern Pacific. Mr. Mahl has for the last two years performed many of the duties of this office as Engineer, assisting General Manager Kruttschnitt, who, as Chief Engineer, as well as General Manager, had direct supervision of this department. Mr. Mahl is a son of Mr. W. T. Mahl, who was Assistant to President Huntington in his New York office.

—Mr. T. H. Sears, of the Atchafalaya Topeka & Santa Fe, who some months ago was assigned to the St. Louis, Kansas City & Colorado road, owned by the Atchafalaya, as acting General Manager, has been transferred back to the Western Division, of which he was formerly Superintendent. When Mr. Sears was transferred to St. Louis the Western Division was included in the jurisdiction of Mr. Charles Dyer, General Superintendent of the Western Grand Division. He then removed his headquarters from Colorado Springs to Pueblo. Mr. Sears' headquarters will hereafter be at La Junta, Col., instead of Pueblo.

—Colonel S. W. Fordyce, of St. Louis, has recently been appointed Receiver of the Pine Bluff & Eastern road in Arkansas. This is the second road in Arkansas which Colonel Fordyce controls as Receiver. About a month ago he was appointed to that office on the Stuttgart & Arkansas River road. The ownership of both these lines is practically the same, and receivership proceedings were brought against both of them at about the same time. These appointments will not in any way interfere with the duties of Colonel Fordyce as President of the St. Louis Southwestern road.

—Mr. W. A. Vaughan has been appointed Assistant General Superintendent of the Southern Railway, with office at Chattanooga, Tenn. He is to have charge of the transportation matters relating to the fourth and seventh operating divisions of the company. This includes the Alabama Great Southern road, the operation of which was assumed last week by the Southern Railway. For several months past Mr. Vaughan has been located at Washington, D. C., as Superintendent of Car Service of the Southern Railway. Before his transfer to Washington he was General Superintendent of the East Tennessee, Virginia & Georgia.

—The term of office of Mr. G. Gunby Jordan as State Railroad Commissioner of Georgia, expired last week.

but no appointment of a successor has yet been made, and Colonel Jordan is still performing the duties of that office. He has not served a full term in the office, having been appointed as the successor of the late Virgil Powers, who was so long identified with Southern railroad interests. Colonel Jordan is a candidate for re-appointment, and although there are several candidates he seems to be in the lead. The appointment of a Commissioner will not be made until the next meeting of the General Assembly. Mr. Jordan has been manager of several railroads in Georgia.

—Colonel A. L. Rives, General Superintendent of the Panama Railroad, has resigned that office, which he has held for many years. Colonel Rives will retire altogether from active work, being now over 70 years of age. He has had a very honorable and busy life, and probably feels that now he has earned a long rest. During the civil war he was Chief of Engineers in the Confederate States Army. At the close of the war he became connected with Southern railroads. He held important offices with the Virginia Midland and other roads in those states, finally becoming General Manager and then Vice-President of the Richmond and Danville. These offices he held for many years. Then he went into the service of the Panama Railroad, and has had charge of the operation of that line, being stationed at Panama.

—General William Mahone died in Washington, October 8. He was born in Southampton County, Va., Dec. 1, 1836, graduated in 1857 from the Virginia Military Institute at Lexington, was a short time a teacher of mathematics, then became an engineer. He was engaged on the construction of several southern railroads and after the war he resumed his connection with railroad enterprises, was President of the Southside railroad and the Virginia and Tennessee and effected the consolidation which was known as the Atlantic, Mississippi, & Ohio railroad from Norfolk, Va., to Bristol, Tenn., now a part of the Norfolk & Western. This company went into the hands of receivers, which process eliminated General Mahone. Later he became a very active politician and a very dangerous one, and he sat six years in the United States Senate, where we believe he did no good. General Mahone was a gallant and distinguished soldier and we have never heard that there was a spot on his war record.

ELECTIONS AND APPOINTMENTS.

Alabama, Great Southern.—The stockholders held their annual meeting at Birmingham, Ala., last week, electing the following Directors: Samuel Spencer, C. H. Coster, J. P. Morgan, Jr., F. L. Stetson, W. G. Oakman, A. J. Thomas, G. W. Maslin, S. M. Felton, C. C. Harvey, Francis Pavey, H. Doughty Browne.

The operation of this road was assumed by the Southern Railway on Oct. 3, and the election of the following officers have been announced by that company for that road: President, Samuel Spencer, Vice-Presidents, A. B. Andrews, W. H. Baldwin, Jr., and W. W. Finley; Secretary, Josiah T. Hill.

The following appointments have been made: W. A. Vaughan, General Superintendent; J. M. Culp, General Traffic Manager; Chas. H. Davis, Comptroller; H. H. Tatum, Treasurer. The address of the Comptroller and Treasurer will be as heretofore, Cincinnati. The address of the General Superintendent will be Chattanooga, Tenn. The address of the other officials, except the President, will be Washington, D. C.

In the traffic department the following appointments have been made: H. F. Smith, General Freight Agent, office Odd Fellows' Temple, Cincinnati, O.; W. A. Turk, General Passenger Agent, office No. 1300 Pennsylvania Avenue, Washington, D. C.; C. A. Bencoter, Assistant General Passenger Agent, office Knoxville, Tenn.

The following are the appointments in the transportation department: A. J. Frazier, Superintendent; C. Skinner, Master Mechanic; M. A. Zook, Engineer Maintenance of Way.

Albany, Florida & Northern.—J. S. Crews has been appointed General Manager, with headquarters at Albany, Ga., succeeding Cecil Gabbett, who has resigned to give his entire time to the management of the Georgia & Alabama road.

Atlantic & North Carolina.—The following Board of Directors have been appointed Governor of this road, which is owned by the State of North Carolina, the Governor of which also appoints the President. On the part of the state: W. S. Chadwick, President; W. W. Carraway, W. L. Kennedy, Charles Dewey, Enoch Wadsworth, C. E. Fory, S. W. Latham, C. H. Fowler. On the part of the private stockholders the following were elected at a meeting of the stockholders held at Morehead, N. C., last week: John M. Morehead, T. D. Webb, Dempsey Wood, L. H. Cutler. The next meeting of the stockholders was set for Sept. 15, 1896, at Newbern, N. C.

Baltimore & Ohio.—Chas. M. Barnett has been appointed Southern Passenger Agent, with headquarters at Tampico, Mexico.

Bangor & Aroostook.—E. A. Nutting has been appointed Car Accountant for this company, with office at Bangor, Me.

Canadian Pacific.—X. H. J. Colvin has been appointed District Passenger Agent, with office at No. 197 Washington street, Boston. The position of New England Passenger Agent has been abolished.

Carrabelle, Tallahassee & Georgia.—The office of Traffic Manager was abolished on Oct. 1, and hereafter the duties of that officer will be performed by the General Freight and Passenger Agent. G. N. Saussy, Assistant General Freight and Passenger Agent, has been appointed General Freight and Passenger Agent, with headquarters at Tallahassee, Fla.

Centralia & Chester.—At the annual meeting of the stockholders in Centralia, Ill., last week, J. D. Gillett of New York was elected President, T. B. Needles, of Nashville, Ill., Vice-President, R. H. Rosborough, of Sparta, Ill., Treasurer and General Manager, and S. L. Dwight, of Centralia, Secretary and General Counsel.

Chattanooga Belt.—This company has been organized to succeed the Chattanooga Union road. These directors were elected: H. S. Chamberlain, of Chattanooga; Judge Lewis Shepherd and H. H. Tatum, of Cincinnati.

Cincinnati Southern.—Receiver S. M. Felton has issued the following order: "Owing to the removal of the headquarters to the lines below Meridian to New Orleans on Oct. 1, the position of General Manager is abolished and the duties will hereafter be performed by the Receiver."

Cleveland, Lorain & Wheeling.—The annual meeting of the stockholders was held last week and the old Board of Directors re-elected as follows: M. D. Wood-

ford, Eugene Zimmermann, Cincinnati; James A. Blair, Henry A. Taylor, Alfred Sully, E. B. Thomas, H. F. Shoemaker, John B. Dennis, New York; W. R. Woodford, W. A. Shoemaker, D. P. Eells, L. A. Russell, Cleveland; J. Walter McClumonds, Massillon, O.

Cleveland Terminal & Valley.—This company has been organized to succeed the Valley of Ohio, and has elected the following directors: Thomas M. King, Alexander Shaw and W. H. Blackford, of Baltimore; Henry M. Kiem, S. T. Everett, J. H. McBride, F. H. Goff and G. A. Garretson, of Cleveland, and L. V. Bockins, of Canton, O. The directors have elected the following officers: President, Thomas M. King; Vice-President, Secretary and Treasurer, Henry M. Kiem; General Superintendent, J. T. Johnson; Auditor, James Bartol. Mr. King is Vice-President of the Baltimore & Ohio, and Messrs. Kiem, Johnson and Bartol have been associated with the management of the road for sometime.

Columbia, Newberry & Laurens.—C. M. Tew has been appointed Auditor, with office at Columbia, S. C. The office of Assistant Superintendent has been abolished.

Columbia Railway & Navigation Co.—The following officers were elected at Portland, Ore., last week: President, Paul F. Mohr, of New York; Vice-President, David K. Stevens, of Tacoma, Wash.; Secretary, Victor K. McElheney, of New York; Treasurer, Francis P. Lowry, of New York. The Board of Trustees consists of the President, Vice-President, Secretary and Treasurer; and Messrs. C. O. Bates, of Tacoma; Hon. W. Lair Hill, of Oakland, Cal.; C. B. Niblock, of Chicago; A. A. Hutchinson, of New York, and W. D. Tyler, of Tacoma.

Findlay, Fort Wayne & Western.—A. B. Merriam has been appointed Auditor, with office at Ft. Wayne, Ind.

Franklin & Megantic.—At the annual meeting last week, held at Kingfield, Me., the following directors were elected: Directors, V. B. Mead, Boston; Philip H. Stubbs, Strong, Me.; John Winter, of Kingfield; F. S. Mead, Boston, and W. S. Heath, Salem. The directors elected V. B. Mead President, Philip H. Stubbs as Clerk and Treasurer, and F. S. Mead Superintendent.

Georgia & Alabama.—Bernard R. Guest has been appointed Assistant Treasurer, with headquarters at Americus, Ga., vice William H. Macfarland, who resigns to give his entire time to his duties as Auditor.

Grand Rapids & Indiana.—F. A. Gorham having resigned the offices of Secretary and Auditor to engage in other business, R. R. Metheny has been elected Secretary and Auditor, and assumed the duties Oct. 1.

Great Northern.—The following appointments are announced: W. A. Seward, General Agent, Boston, vice C. A. Butler, resigned on account of ill-health; W. G. McLean, General Agent, Toronto, vice H. C. McMicken, transferred; A. C. Harvey, District Passenger Agent, Philadelphia, vice F. W. Huntington, transferred.

Gulf Beaumont & Kansas City.—Frank Aldridge has been appointed Superintendent, with headquarters at Beaumont, Tex., vice S. A. McNeely, General Superintendent.

Illinois Central.—The position of General Yard Master in Chicago has been abolished, and the jurisdiction of the trainmaster of freight terminals extended to embrace all yard switching, transfer, and freight train service within the Chicago terminal district. C. Connors has been appointed Assistant Train Master of Freight Terminals, in charge of night service.

Lake Erie & Western.—Calvin S. Brice, Henry W. Cannon and John W. Doane have been elected directors of the company for three years, and Erskine S. Phelps for one year.

Louisville & Nashville.—At the annual meeting of the company in Louisville last week the following directors were elected: August Belmont, J. D. Probst, H. E. Garth, John I. Waterbury, J. A. Horsey, William Martens, E. Mora Davison, G. M. Lane, J. L. Helm, J. D. Taggart, M. H. Smith, Attilla Cox and Rudolph Ellis. The new directors are E. Mora Davison, Attilla Cox and Rudolph Ellis, who succeed Albert Fink, Thomas Rutter and Edmund Smith.

Mexican National.—Baker Mangum having resigned the position of Division Superintendent at San Luis Potosi, Mex., the duties of that division will be assumed by the General Superintendent, E. N. Brown.

Minneapolis & St. Louis.—At the annual meeting of the stockholders of the company last week the following directors were re-elected: William L. Bull, Edwin Hawley, F. E. Palmer, F. H. Davis, Richard B. Hartsborne, William Strauss, August Belmont, W. A. Read, and John E. Searles. The following officers were elected by the new board: President, William L. Bull; Vice-president, Edwin Hawley; Treasurer, Richard B. Hartsborne, General Counsel, William Strauss; General Solicitor, Albert E. Clarke; Secretary, Joseph Gaskell; General Manager, A. L. Mohler. The new board will be classified so that three directors will serve one year, three for two years, and three for three years.

Missouri, Kansas & Texas.—F. E. Miller has been appointed Superintendent of Dining Service, with headquarters at St. Louis, Mo.

Monongahela River & Snowden.—The following are the incorporators of this new Pennsylvania company: W. S. Jones, E. R. Morse, Theo. Hariman, R. T. Kincaid, W. A. Galbraith, D. D. Miller and T. O. C. Campbell, all of Pittsburgh. Mr. Campbell is President.

New Orleans & Southern.—F. E. Sprague, has been appointed Superintendent, with headquarters at New Orleans, La.

Northern New York.—E. La Lime has been appointed Superintendent in addition to his duties as Master Mechanic, vice J. H. Hamilton, resigned to accept other service. His office is at Santa Clara, N. Y.

Northern Ohio.—Vice-President and General Manager of the Lake Erie & Western has issued a circular announcing that the Lake Erie and Western having leased the Northern Ohio (formerly Pittsburg, Akron & Western), extending from Akron to Delphos, Ohio, that company has assumed control, under the following officers: Traffic department: H. C. Parker, General Traffic Manager; S. B. Sweet, Assistant General Freight Agent; A. S. Miller, Division Freight and Passenger Agent, Akron, Ohio, and C. F. Daly, General Passenger Agent. Treasury and Accounting Department: W. A. Wildhack, Auditor, and A. D. Thomas, Assistant Treasurer. Operating Department: J. H. Sample, General Superintendent, Akron, Ohio; J. H. Pirkey, Consulting Engineer; P. Reilly, Superintendent of Equipment, and T. H. Perry, Purchasing Agent. Legal Department: W. E. Hackedorn, General Solicitor, and John B. Cockrum, General Attorney. The Northern Ohio will con-

tinue to be operated as an independent property, and with separate accounting.

Ohio Southern.—The following appointments are announced: General Manager, A. S. Dunham; Chief Engineers, B. W. Fenton and H. E. Rice.

Peoria, Decatur & Evansville.—The stockholders met at Peoria, Ill., Oct. 2, and elected William E. Strong, John T. Lamson, and John H. Grant, all of New York City, as directors.

Portland & Rochester.—The following Directors were elected at Portland, Me., Oct. 1: J. S. Ricker, Deering; George P. Wescott, Portland; Lucius Tuttle, Boston; Nathan Webb, Portland; Frederick Robie, Gorham; W. G. Davis, Portland; Charles McCarthy, Jr., Portland; Franklin A. Wilson, Bangor, and Jos. H. Manley, Augusta. Wm. H. Conant was elected. The Directors elected Geo. P. Wescott President, and Wm. H. Conant Treasurer.

Santa Fe, Prescott & Phoenix.—The following appointment are now formally announced, some of them having been previously reported: George M. Sargent has been appointed General Freight and Passenger Agent of this company, vice F. A. Healy, resigned.

Mr. Francis J. Sarmiento has been elected Auditor of this company, and assumed the duties of the office Oct. 1; J. J. Wragovich has been appointed Assistant Auditor of this company, with headquarters at Prescott, A. T.

Seaboard Air Line.—Robert A. Parke has been appointed General Agent, with headquarters at Washington, D. C. He will have charge of the interests of this company in Washington, Baltimore and the territory north.

Southern Pacific.—Changes on the Atlantic system have been announced as follows: Office of Master Mechanic abolished. J. J. Ryan appointed Superintendent of Motive Power, headquarters in Houston, with P. J. Maguire, Master Car Builder, headquarters at Algiers, La., and J. R. Cade, Master Car Builder, headquarters at Houston. J. T. Mahl appointed Engineer of Maintenance of Way; Thornwell Fay appointed Assistant to General Manager Van Vleck, headquarters at New Orleans, with general jurisdiction over the company's terminals at New Orleans, Algiers and Gretna.

St. Louis, Kansas City & Colorado.—W. M. Mitchell has been appointed Acting Manager, Treasurer and Auditor of the road, with headquarters in St. Louis, vice T. H. Sears, who returns to the Atchison as Division Superintendent at La Junta, Col.

Velasco Terminal.—L. L. Foster is now Second Vice-President and General Manager of this road, with office at Velasco, Tex. G. W. Angle continues in his office of Assistant General Manager. Mr. Foster was formerly a State Railroad Commissioner of Texas.

West Virginia Central & Pittsburg.—W. H. Bower, Assistant General Manager, has been appointed Purchasing Agent in addition to his other duties.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Augusta Southern.—This road, formerly a narrow gauge, is now operated as a standard gage road as far as Ayers, 50 miles distant from Augusta.

Bay Terminal.—This company, recently organized at Toledo, O., by officers of the Sun Oil Co., one of the Standard Oil properties, has purchased the right of way for about one mile of road from Rockwell Junction, near Toledo, to the company's refineries. Mr. Robert Pugh, of the Sun Oil Co., states that this part of the road will be built at once and that eventually it will be extended below Ironville, O.

Bloomington.—This company has been organized to build a line to connect two towns in Grant County, Wis., with the Chicago & Northwestern road, and has filed articles of incorporation with the Secretary of State at Madison. It will extend from Bloomington through Woodman to Lancaster, a distance of 35 miles. The capital stock is \$150,000. A. C. Tubbs and H. E. Tyler are incorporators.

Buffalo & Susquehanna.—The extension beyond Galeton, Pa., north to Perryville, has been completed, and freight is now being transported over the new extension. The line has not yet been ballasted, but this work will be finished during the present month, when passenger trains will be run. The construction of this branch, about 25 miles long, connects at Perryville with the Wellsville, Coudersport & Pine Creek road, which extends to Wellsville, N. Y., connecting there with the New York, Lake Erie & Western. That property has been purchased by the Buffalo & Susquehanna, so that it secures a connection over its own line with the New York, Lake Erie & Western.

California, Idaho & Montana.—Articles of incorporation have been filed in Wyoming with the Secretary of State by this company, which proposes to construct a road from Butte City, Mont., to San Francisco. The capital stock is \$30,000,000. The incorporators are: Moritz Lippman, of New York; H. M. Dickey, of Chicago, and Denver and Boise City people.

Canadian Pacific.—D. McGillivray, of Vancouver, B. C., has received the contract from the Canadian Pacific for the construction of the branch line along Arrow Lake, in the southern part of British Columbia. When the line is completed the company will have direct communication with the Kootenay mining district, south of the main line, all the year around.

Centralia & Chester.—President Gillette, while in Centralia, Ill., last week, to attend the annual meeting, met a committee of citizens who wanted to see the road extended to Salem, Ill. President Gillette made a proposition that, if the citizens of Centralia would provide the right of way from Centralia to Salem, he would construct the road within the coming year. The committees of the two cities formally accepted the proposition, and the work will begin at once.

Charleston & Savannah.—Another attempt by the business interests of Charleston, S. C., to induce the company to build into the city limit will be made this winter. The eastern terminus of the Charleston & Savannah division of the Plant System is at Ashley Junction, S. C., where connection is made with the Atlantic Coast Line. Ashley Junction is seven miles north of Charleston. Efforts have been made from time to time to persuade President Plant to run the line directly into the city. Last spring the City Council agreed to grant certain privileges for the necessary right of way, but the concessions were not such as Mr. Plant was willing to accept. President Plant is expected at Charleston

this month when it is hoped some agreement will be reached.

Chattanooga Belt Line.—The Belt Line Railroad Company of Chattanooga, Tenn., has been organized with \$300,000 capital stock. This company represents the purchasers of the old Union Railway, and will shortly effect a lease of its property for 50 years to the Alabama Great Southern road, which company is controlled by the Southern Railway.

Cincinnati, Jackson & Mackinaw.—George M. Huss, the well-known railroad contractor of Chicago, has secured the contract for building the Cincinnati & Jackson road, the northern extension of this line. About 30 miles of new road will be built from Addison, the present northern terminus of the road, into Jackson, Mich. It is understood that all the right-of-way has been secured, except through one township, and it is expected that a portion of the work will be done before freezing weather. The road will be substantially constructed, all the bridges will be built with stone abutments and a 60-lb. rail section will be used. A mortgage to secure an issue of bonds on the new road amounting to \$300,000 is being regarded, the Central Trust Co., of New York, being the trustee of the bonds.

Cleveland Terminal & Valley.—Incorporation papers were filed at Columbus, O., last week for the reorganization of the Valley Railway, which now takes the name of the Cleveland Terminal & Valley Railway Company, with a capital stock of \$7,400,000. The incorporators are M. R. Dickey, W. F. Carr, Jas. Bartol, Chas. H. Galts and Francis M. Goff. The Baltimore & Ohio now controls the property.

Second Vice-President King, of the Baltimore & Ohio, and President of this company, in a newspaper interview as to the plans of the Baltimore & Ohio for terminal facilities in Cleveland, said: "There is valuable terminal property in Cleveland which has never been improved. We propose to improve it, and means to that end are provided in the plan of reorganization. Just what amount is provided for terminal facilities I do not care to say until our work, now simply preliminary, has progressed." The latter statement was made in response to a question whether as much as \$1,000,000 would be expended.

Columbia Railway & Navigation Co.—The annual meeting of the stockholders of this company was recently held in Portland, Or., and Mr. Paul F. Mohr was re-elected President. The project is for a portage railroad about 22 miles in length near The Dalles, Or. The line has been surveyed along the north side of the Columbia River, around the Cascades in the Columbia River at the Dalles, and its construction will connect the navigable waters of the Snake River, and the Upper Columbia with the Lower Columbia. Some grading has already been done on the road, but construction work has been suspended for a year or so past. It is understood that Mr. Mohr will leave New York shortly for London to complete long discussed arrangements for building the road. A pretty full description of the project was given in the *Railroad Gazette* of 1893 and also in 1891.

Duluth & Mesaba.—This company has been incorporated at St. Paul. It is already under construction as a logging line in the Mesabi range for the Cloquet Lumber Co., and is incorporated to get the benefit of the state railroad laws. For the present, at least, it will be only a logging line, though the line is being built more substantially than is usual with such roads.

Erie & Central New York.—This road is being built from Cortland to Cincinnatus, N. Y., through a fertile region, and is rapidly nearing completion. It is expected that regular trains will be running early in November. The road is being built and equipped in a substantial manner. Part of the rolling stock is expected this week. Next season it will be extended to connect with the Erie and also with the D. & H. R. R. No bonds have yet been issued. J. S. Bull, of Cortland, N. Y., is General Manager.

Kansas City, Pittsburgh & Gulf.—Freight and passenger train service, south of Kansas City, has been extended to Stilwell, I. T., a new station 30 miles south of Siloam Springs, Ark. Stilwell is named in honor of Vice-President Stilwell. By Nov. 1 the road will be built and open for traffic to Salinas, I. T., the crossing of the Kansas & Arkansas Valley branch of the Missouri Pacific 25 miles south of Stilwell. Work is being pushed rapidly and the road will reach Poteau, I. T., 30 miles south of Fort Smith, on March 1.

Kansas City, Watkins & Gulf.—At an election held at Alexandria, La., last week on the proposition to authorize a tax on the township property sufficient to raise \$150,000 to be turned over to this railroad company to secure its extension from that point to Natchez and Shreveport, the tax was carried by a large majority.

Lehigh Valley.—The company is to build a "cut-off" between Easton and Laurys, Lehigh County, Pa., to relieve traffic on the main line. The proposed new line will pass through a section of Northampton and Lehigh counties, which is now without railroad communication, and will reduce the rail distance between the points by about 15 miles.

Minneapolis, New Ulm & Western.—Articles of incorporation have been filed in Minnesota. The company has begun work on a line 18 miles in length, connecting the city of New Ulm with the Minneapolis & St. Louis road, and will have all work, except a bridge across the Minnesota River, completed this year. It is supported, it is said, by prominent capitalists of Minneapolis and the intention is to make the line a connection for the Missouri River and the southwest to the cities of Minneapolis & St. Paul and Lake Superior at Duluth. The present link will form quite an important local connection.

Monongahela River & Snowden.—This company has been incorporated in Pennsylvania to build a road from a point near the borough of Duquesne, in Allegheny County, Pa., to a point in Snowden Township, also in Allegheny County. The length of the road is about 10 miles. T. O. C. Campbell, Pittsburgh, is President.

Monongah & Ohio River.—President J. N. Camden states that the contracts for building this new line will be let early next spring. The new road will be an important one, and will give a new Ohio River outlet to the West Virginia Central & Pittsburgh and Monongahela River roads, of which ex-Senator Camden is President. The route is from the mouth of Bingamon, on the Monongahela River road, to New Martinsville, at the mouth of Fishing Creek, in Wetzel County, West Virginia, on the Ohio River.

Northern Pacific.—The receivers are said to have arranged to extend the branch which connects the large Keystone farm, near Euclid, in Polk County, Minn., with the Red Lake Falls branch, a distance of 12 miles,

north through the towns of Tabor and Farley into Marshall County, paralleling the Great Northern's St. Vincent line. The right of way has been secured by local parties, deeds are made and grading has begun. The line will extend through a rich wheat-growing district.

Oxford & Coast Line.—Engineers were last week engaged in surveying the route of this new road to be built from Oxford, N. C., to a point on the Durham & Northern road. This road will be built at once and it is the intention to have the last rail laid by Jan. 1, 1896. The road will put Oxford and an important rich tobacco section of country in connection with the Southern Railway (through the connection made with the Durham & Northern) at Durham. At present the only outlet Oxford (which is an important town and tobacco market) has is through a short branch line—the Oxford & Henderson—with the Raleigh & Gaston road, of the Seaboard Air Line system, at Henderson.

Patten & Sherman.—The articles of incorporation of this company have been filed with the Maine Railroad Commissioners. The company has been organized to construct a road from a point on the Bangor & Aroostook to Patten, Me., 5½ miles. Albert A. Burleigh, of Houlton, is President. As already stated the line is to be a branch of the Bangor & Aroostook, but will be constructed as a separate company.

Reynoldsville, Warren & Buffalo.—Active preparations are being made for the construction of this road, a new bituminous coal carrying line in the interest of the Bell, Yates & Lewis Co., of Rochester. S. B. Elliott, of the Bell, Yates & Lewis Co., is President, and under his supervision three parties of engineers are now at work on the surveys for the proposed line. The Reynoldsville & Fall Creek tracks, owned by Bell, Yates & Lewis, will be used from Reynoldsville to Fall Creek, and the new line will be constructed from the latter point to Warren.

Riverside & Hammond.—This company has just been formed to build an extension of the Mississippi River & Bonne Terre Railroad into St. Louis. The new company is to build from Riverside, the present terminus of the existing road, on the Mississippi River, to Hammond Station, on the St. Louis & San Francisco road, the distance being 24 miles. The engineers are now making a final location of the road. A number of contracts for construction material have already been let, the rails and track fastenings to the Illinois Steel Co. and the iron bridge work to the Union Bridge Co. There will also be considerable masonry bridge work, which has not yet been given out to contract. One bridge on the line will be a 4-span structure. Altogether there will be 8,760 lineal ft. of piling and other bridge work, contracts for all of which will be given out as soon as the surveys have been made. About 15 per cent. of the excavation will be solid rock and about 10 per cent. loose rock. The heaviest grade on the line will be 40 ft. to the mile and the sharp curve four degrees. Besides the important suburban business out of St. Louis, which the construction of this road will open up, it will also develop an attractive dairy, fruit and truck farming country. The projectors believe that the enterprise will be a paying one from the start. It is thought that the road will be ready for traffic about May, 1896. The incorporators are Messrs. Scullen, Lee, Sands, Church, Hodges, Scott, Burns, Jones, Parson and Baker. Mr. Scullen is President, Mr. Sands General Manager and J. L. Lee Chief Engineer.

Salt Lake City & Mercur.—Work on the extension at the mines at Mercur, Utah, to carry the road's terminus around to and beyond the Mattie group was commenced this week. An order has been placed with the Colorado Coal & Iron Co. for 40 tons of 40-lb. rails.

Southern Pacific.—Work upon the new branch from Crowley, La., in Southwest Louisiana, is progressing rapidly. Already 7½ miles has been completed. The new branch is practically an extension of the Midland branch, extending south from Midland Junction to the property of the Vermilion Canal Co. It is six miles west of Crowley, and the construction gangs are now working upon a 1,200-ft. trestle bridge over Bayou Irrigating plant, which will place the end of the line at the irrigating plant.

St. Joseph Valley.—No trains have been run on this road, in Michigan, for a long time, but it is soon to be put in operation and extended to St. Joseph, Mich., and Mishawaka, Ind., to connect with the Elkhart & Western.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The report of the receivers of earnings for August makes the following comparison with 1894.

TOTAL FOR SYSTEM.			
	1895.	1894.	
Gross earn.....	\$3,220,686	\$3,298,043	D. \$77,357
Oper. exp.....	2,558,594	2,443 8 9	I. 115,005
Net earn.....	\$662,092	\$854,454	D. \$192,362
Prop. exp. to gross.....	79%	74%	
Net two mos.....	1,061,870	1,076,328	D. 14,458

ATCHISON PROPER.			
	1895.	1894.	
Gross earn.....	\$2,394,547	\$2,444,425	D. \$49,877
Oper. exp.....	1,974,148	1,915,710	I. 58,438
Net earn.....	\$420,399	\$528,715	D. \$108,315
Net two mos.....	659,937	527,721	I. 132,215

ATLANTIC & PACIFIC.			
	1895.	1894.	
Gross earn.....	\$228,311	\$259,991	D. \$31,679
Oper. exp.....	251,991	215,880	I. 36,111
Net earn.....	\$6,320	\$44,110	D. \$37,790
Net two mos.....	21,379	41,554	D. 20,175

ST. LOUIS & SAN FRANCISCO.			
	1895.	1894.	
Gross earn.....	\$537,827	\$596,626	D. \$58,799
Oper. exp.....	305,454	311,998	I. 6,544
Net earn.....	\$232,373	\$284,628	D. \$52,255
Net two mos.....	400,554	464,050	D. 63,496

Alabama Great Southern.—At the annual meeting of this company in Birmingham, Ala., last week, a new board of directors was elected, a majority of them being representatives of the Southern Railway. This, of course, is in accordance with the announced plan when the contest with the Cincinnati, Hamilton & Dayton for the majority stock of the company was amicably settled. The Alabama Great Southern is to be operated separately from the other lines of the Southern Railway, and for the present at least no consolidation of local offices will be made. The road extends from Chattanooga to Meridian, Miss., 300 miles, forming part of the Queen & Crescent line from Cincinnati to New Orleans, and the

autonomy of the Queen & Crescent is not to be interfered with by the transfer of the control of the Alabama Great Southern to the Southern Railway.

Buffalo & Susquehanna.—The first annual report of the company, covering a period of 21 months from Oct. 1, 1893, to June 30, 1895, shows gross earnings \$581,589, operating expenses \$394,611, net earnings \$236,978, fixed charges and sinking fund \$180,527, dividend \$44,400, leaving a surplus of \$12,301. The following are the results for the last fiscal year compared with those of the previous year:

	1894.	1895.	Inc.
Gross earn.....	\$276,433	\$353,832	\$77,399
Oper. exp.....	159,170	213,477	54,307
Net earn.....	\$117,263	\$140,355	\$23,092
Int. and sinking fund....	95,517	105,649	10,132
Surplus.....	\$21,846	\$34,706	\$12,960

For the purpose of comparison by full fiscal years, the statement of 1894 includes the operations of the Sinnehoning Valley road, partly estimated for the three months, July, August and September, 1893. The net profit shown, however, is that of the Buffalo & Susquehanna proper.

Central of Georgia.—This road was sold to Samuel Thomas and Thomas H. Ryan, of the Reorganization Committee at Savannah, Ga., Oct. 7, for \$2,000,000. The sale took place in pursuance of a decree of the United States Circuit Court for the Southern District of Georgia in the suits of the Farmers' Loan & Trust Company of New York and Alexander Brown & Sons, of Baltimore.

Chicago & Eastern Illinois.—The following figures are from the annual report for the year to June 30:

	1895.	1894.	1893.
Freight.....	\$2,876,234	\$2,663,734	\$3,417,503
Passenger.....	687,209	1,069,133	872,291
Express.....	41,713	41,063	
Mail.....	52,521	53,229	156,565
Miscellaneous.....	10,192	32,925	

	1895.	1894.	1893.
Total gross.....	\$3,667,869	\$3,860,114	\$4,446,959
Oper. exp.....	\$3,089,339	\$3,390,332	
Maint. way.....	487,351	438,586	
Transportation.....	1,426,395	1,363,030	
General.....	117,949	128,558	
Taxes.....	\$2,334,814	\$2,250,259	2,990,315
Total exp.....	\$2,508,370	\$2,409,710	
Net earn.....	\$1,359,494	\$1,609,815	1,456,644
Prop. exp. to gross.....	63.65	58.30	67.34
Other income.....	169,653	125,957	66,742

	1895.	1894.	1893.
Total net earn.....	\$1,329,151	\$1,576,092	\$1,523,386
Interest.....	962,901	942,788	913,015
Rentals.....	234,958	238,756	221,071
Total charges.....	\$1,197,859	\$1,181,544	\$1,134,086
Balance.....	131,291	394,548	389,300
Div. pref. stock.....	269,842	286,914	285,986

	1895.	1894.	1893.
Deficit.....	\$158,550	Sur. \$107,634	Sur. \$105,314

Chicago & South Side Rapid Transit.—This company, better known as the "Alley L" road, went into the hands of a receiver on Oct. 5, payment having defaulted on the bonds of the corporation. Marcellus Hopkins, President of the road, was made Receiver, his appointment being satisfactory to the bondholders. The application for a Receivership was made by the Northern Trust Co., and the Illinois Trust & Savings Bank, and was unopposed. The directors of the road waived the clause in the bonds stipulating that six months must elapse after the default of interest payment before foreclosure. The first and second mortgage bondholders have come to a friendly agreement for the reorganization of the company. The first mortgage bonds amount to \$7,500,000, and the second mortgage bonds to \$3,000,000.

Cleveland, Cincinnati, Chicago & St. Louis.—The following is the August statement of earnings:

	1895.	1894.	1893.
Gross earn.....	\$1,212,294	\$1,216,777	\$1,207,142
Oper. exp.....	926,339	888,481	896,478
Net earn.....	\$285,955	\$327,596	\$310,664
Prop. exp. to gross.....	76%	73%	74%
Fixed charges.....	233,824	233,858	224,204

	1895.	1894.	1893.
Surplus.....	\$132,111	\$93,738	\$86,460
Net two months.....	606,143	432,315	547,241
Surp. two months.....	13,241	Def. 34,010	Sur. 104,654

In August, 1892, net earnings were \$415,179; in 1891, \$429,802; in 1890, \$345,617.

Concord & Montreal.—At the annual meeting of the stockholders at Concord, N. H., Oct. 8, the directors were re-elected and it was voted to lease the Franklin & Tilton road and sub-lease it to the Boston & Maine. The directors in their report stated that since the leasing of the road to the Boston & Maine there had not been sufficient time to make an inventory of the property owned at the time of the lease, and that for a like reason it was impossible to give a detailed statement of the financial condition of the corporation.

Great Northern.—The Attorney-General of Minnesota has applied to District Judge W. L. Kelly, at St. Paul, for an injunction, pending the suit restraining the Northern Pacific and Great Northern from "consolidating," as it is termed in the application. The action is entirely separate from and independent of the recent suit in the Federal Courts, and is brought by the Attorney-General on the grounds that in entering into such "consolidation" the Great Northern is exceeding its corporate powers and moving contrary to the policy of the State in destroying competition.

Memphis & Charleston.—The receivers report earnings for the fiscal year ending June 30. Figures for 1893 were incomplete, owing to the intervention of the receivership:

	1895.	1894.	Inc. or dec.
Passenger.....	\$339,829	\$363,485	D. \$23,656
Freight.....	747,715	793,218	D. 51,508
Express.....	25,124	25,124	
Mail.....	46,043	45,531	I. 508
Miscellaneous.....	43,533	41,456	I. 2,067

	1895.	1894.	Inc. or dec.
Total.....	\$1,202,260	\$1,274,814	D. \$72,559
Oper. exp.....	\$347,008	\$373,244	D. 26,236
Transp.....	266,870	271,024	D. 4,154
Maint. cars.....	73,977	75,412	D. 1,435
Maint. way.....	187,516	176,296	I. 11,220
General.....	109,351	125,578	D. 16,227

	1895.	1894.	Inc. or dec.
Total.....	\$94,722	\$1,021,554	D. \$36,832
Net earn.....	217,547	283,261	D. 35,714
Less taxes.....	4,000	49,999	D. 4,999
Surplus.....	\$172,547	\$203,262	D. \$30,715

New York, New Haven & Hartford.—President Clarke in the annual report of this company just published, announces that the New Haven road has pur-

chased the shares of the New England road now held by Mr. J. Pierpont Morgan, of New York, being a majority of the total capital stock. President Clarke also states that the New Haven company has purchased \$5,000,000 of the new five per cent. mortgage bonds of the New England road. The only condition of the acceptance of Mr. Morgan's offer of his stock is its delivery prior to the annual meeting of the New England company. He adds that it is not proposed to make any consolidation or lease of the New England road.

Northern Ohio.—The stockholders at a special meeting at Lima, O., ratified the lease to the Lake Erie & Western. The directors were authorized to issue first mortgage 50-year five per cent. bonds, \$15,000 to the mile, making a total of about \$20,000,000. The interest is guaranteed by the Lake Erie & Western. It was also voted to expend \$1,000,000 of the amount at once in the betterment of the road.

Northern Pacific.—The Receivers report the earnings for September and the three months of the fiscal year as follows:

Month of September:	1895.	1894.	Inc. or dec.
Freight.....	\$1,851,639	\$1,754,834	I. \$96,805
Passenger.....	438,465	441,383	D. 2,918
Miscellaneous.....	7,412	7,297	I. 115
Total.....	\$2,297,516	\$2,203,514	I. \$94,002
Three months to Sept. 30:			
Freight.....	\$1,241,354	\$3,678,022	I. \$513,335
Passenger.....	1,496,503	1,094,433	I. 204,070
Miscellaneous.....	23,249	2,547	I. 702
Total.....	\$5,561,106	\$4,775,002	I. \$786,104

The receivership matters have been further complicated by the developments of the past week. The conflicting claims as to jurisdiction by the United States Circuit Courts of Washington and Wisconsin are still asserted, and each court has appointed separate Receivers. Judge Jenkins, of the Wisconsin Circuit Court, has appointed Mr. E. H. McHenry Chief Engineer of the road, and F. B. Bigelow, of Milwaukee, as announced last week, and these appointments have been confirmed by Judge Sanborn, of the United States Circuit Court at St. Paul. These Receivers will exercise authority over the property of the company in the states of Wisconsin, Minnesota and North Dakota. Judge Hanford, of the Washington Circuit Court, has appointed Mr. F. A. Burleigh, a Seattle lawyer, General Counsel of the Oregon Improvement Co., as Receiver. This appointment has been confirmed by Judge Gilbert, of the Oregon Circuit, and it is expected that the Circuit Courts for Idaho and Montana will also confirm his appointment, so that he will have jurisdiction from the Pacific coast to the North Dakota line. The receivership matters have also come before the United States Circuit Court at New York, and Judge Lacombe, of that circuit, has issued an order to prevent Receivers Oakes, Payne and Rouse from removing any of the books, money or other property of the company beyond the jurisdiction of his court, or from transferring any of the property which has been in their control. Receivers Oakes, Payne and Rouse had been ordered by Judge Hanford to appear before him at Seattle, Wash., on Oct. 2, and file their accounts as Receivers of the Northern Pacific in his court, and answer to the charges made by President Ives. Having failed to do so, he refused to accept their resignations and removed them from office, appointing Mr. Burleigh receiver for the property in his jurisdiction. Judge Hanford said that for the present he would appoint no additional Receiver. He directed the former Receivers to appear in his court and show cause why they should not be found in contempt for failure to file their accounts as directed, and they were given until Oct. 31 to answer. The receivership contest came before Judge Lacombe, of the Circuit Court of New York, on an application made by the Secretary of the company, and the court issued an order restraining the Receivers from transferring or removing any Northern Pacific property in their possession from the jurisdiction of the court, as stated.

Oregon Improvement Co.—The default in the payment of the interest on the consolidated mortgage bonds of this company on Oct. 1 was followed by the appointment of a receiver by Judge Hanford, of the United States Circuit Court at Seattle, Wash., on Oct. 5. The application for a receiver was made by the Farmer's Loan & Trust Co., the suit being instituted at the request of Mr. W. H. Starbuck, formerly President of the company, and representing the management which was defeated by Mr. Elijah Smith at the recent annual meeting in June. In the statement of the latter officer, published in this column last week, it was estimated that the net earnings between June and December, with the cash on hand, would only be sufficient to pay the first mortgage and sinking fund requirements. Large amounts were needed for repairs to steamships and mines, and therefore it had been decided by the present directors to furnish bonds in default of the consolidated mortgage bond coupons. Mr. C. J. Smith, who was appointed receiver, is General Manager of the company.

Regarding the appointment of a Receiver, President Smith said: "The management did not make application for a Receiver partly because we saw no immediate necessity for such action, and, besides, we were advised by our local counsel, Mr. Burleigh, one of the new Receivers of the Northern Pacific, who was our counsel at that time, and also by another prominent lawyer on the Pacific coast, that the company could not be thrown into the hands of a Receiver, either by us or an adverse interest, until the default upon the consolidated mortgage bonds had continued for 90 days. An application certainly could not have been made on a floating debt claim, as none of those claims is pressing, and we have avoided increasing that debt by not borrowing the money to pay the interest due Oct. 1. It is a question whether the Receivership will stand."

The properties of the company consist of the Pacific Coast Steamship Co., having a fleet of 21 steamers, Columbia and Puget Sound; the Seattle & Northern, and Port Townsend Southern roads, and the Newcastle and Franklin Coal Mines tributary to Seattle in King County, where are 216 miles of railroad, of which 137 are narrow gauge and 79 standard gauge. Four corporations own the lines, and the securities are held by the Oregon Improvement Co.

Pine Bluff & Eastern.—The foreclosure proceedings brought against this property in the United States courts in Arkansas last month have just been decided by Judge Parker and S. W. Fordyce, of St. Louis, appointed Receiver. The company operates about 20 miles of road, built in 1890 east from Pine Bluff, reaching extensive timber lands. The outstanding bonds amount to \$200,000; the Farmers' Loan & Trust Co. being trustee of one-half of the bonds, and Mrs. Gillette, of Pine Bluff, the trustee of the other 100,000 of the bonds. She is also the heaviest stockholder. The President is Mr. F. M. Gillette. The Stuttgart & Arkansas River road, which is

controlled by the same interests, has also recently been placed in the control of the same Receiver.

Savannah & Western.—The committee representing the bondholders of this road, purchased the property at the foreclosure sale at Birmingham, Ala., on Oct. 5. The foreclosure was in pursuance of a decree obtained by the Central Trust Co., of New York. The purchase price was \$1,500,000 and the purchasers will transfer the property to the Central of Georgia Reorganization Committee and the Savannah & Western will be reorganized in harmony with reorganization property and operated as before as part of the Central of Georgia. The reorganization of the Central of Georgia will give the control of the property to the Southern Railway, but it will continue to be operated as a distinct company under its present name.

St. Louis, Alton & Terre Haute.—The company reports for the fiscal year ending June 30:

	1894.	1895.	Inc. or dec.
Gross earn.....	\$1,385,045	\$1,350,055	D. \$34,990
Oper. expen. and taxes.....	856,730	782,528	D. 74,202
Net earn.....	\$528,315	\$567,527	I. \$39,212
Rentals.....	354,280	365,329	D. 11,049
Balance.....	\$144,035	\$202,198	I. \$58,163

To provide funds for maturing obligations to retire the seven per cent. preferred stock and dividend bonds, the company issued \$2,500,000 five per cent. first mortgage bonds, of which all but \$235,000 have been sold. Of the 24,684 shares seven per cent. cumulative preferred stock outstanding Jan. 1, 1891, there had been cancelled 12,976 shares and 11,708 shares have been exchanged for common stock. Of the \$1,357,510 dividend bonds and scrip issued in 1881 only \$79,000 was out at the end of this fiscal year. Common stock has been increased to \$3,470,800 in exchange for preferred stock. The financial statement for the fiscal year ended June 30, 1895, after deducting interest on funded and preferred stock, new equipment and betterments, shows a surplus of \$1,610.

Texas Trunk.—Judge A. P. McCormick, of the United States Circuit Court, at Dallas, Tex., has confirmed the sale of this road, on Aug. 6, to Edward H. Pardee, of New York City, for \$250,000.

TRAFFIC.

Traffic Notes.

The West Jersey Railroad has made reductions varying from 10 to 30 per cent. in local passenger rates on that portion of the line between Gloucester and Glassborough.

A St. Louis paper announces that the freight boats of the Mississippi Valley Transportation Co. have stopped running on account of low water. It is said that the difficulties of navigation on the Mississippi are worse than at any time since 1853.

Atlanta papers report that the railroads entering that city have threatened to withdraw excursion tickets for the Exhibition on account of the large numbers that fall into the hands of the scalpers. The sale of one-way tickets out of Atlanta has fallen almost to nothing.

The fleet of canal boats which recently carried cargoes of rails from Cleveland to New York City, without transfer, took, on their return trip, 7,500 barrels of sugar for Indianapolis, Peoria and St. Louis. The sugar was delivered at Cleveland to the Cleveland, Cincinnati, Chicago & St. Louis.

The Baltimore & Ohio Southwestern is to run a fast mail train both ways after Nov. 20, new postal cars having been purchased from Barney & Smith and Pullman. These trains run between New York and St. Louis in about 30 hours. The newspapers of Cincinnati are in luck, as both the eastbound and the westbound trains leave that city between 3 and 4 o'clock in the morning.

Judge Kerr, in a decision rendered last week at St. Paul, refused to enforce the freight rates prescribed by the State Railroad Commissioners for the transportation of grain over the Great Northern Railway from Crookston and other places to Duluth and Minneapolis. He holds that the railroad company is entitled to earnings sufficient to pay a fair dividend upon the reasonable cost of the road, and that it is not shown that the rates fixed by the railroad company are too high for this.

The Grand Trunk is subject to the same inconvenience referred to above, and is taking action looking to a remedy. The officers of the road have suggested to the Treasury Department that a seal be pasted over the baggage of passengers before they enter Canada, the same to be inspected after the train again enters the United States. Under this arrangement passengers would not be obliged to have their baggage searched, though they could not open it while in Canada.

The enforcement of the order directing that the hand baggage of passengers passing through Canada be examined by United States Customs officers, without regard to whether the same was stamped or the passenger started from an American station, has been very injurious to the business of the Michigan Central. Rather than suffer any further loss of traffic the company has entered into an arrangement with the Government, which goes into effect to-day, and by which inspectors will travel on the trains and inspect baggage en route. Three special officers will be appointed at Detroit, one at Suspension Bridge and one at Buffalo. The expense is to be borne by the railroad company, which will reimburse the Government for the salaries paid. The effect of this will be to obviate detention of trains or annoyance to passengers and will be a source of satisfaction to the traveling public. This system was in vogue up to 1869, the Government bearing the expense. In order to make it more economical, the services of the inspectors were dispensed with, and the practice of stamping hand baggage established.—*Buffalo Courier.*

Lake Freight Rates.

The grain rate from Duluth to Buffalo rose on Tuesday last to five cents a bushel, and several cargoes were chartered at that figure.

A further advance is expected, and some of the iron mines have suspended shipments. Wheat is now the controlling factor in rates, five cents a bushel being equivalent to \$1.86 a ton on ore from Duluth to Lake Erie. Many vessels which had been under contract for the season at 75 and 80 cents a ton for ore, were released Oct. 1, and all at once took grain at the going rate, which was double what they had been earning. In one day 10 wheelbacks, capacity \$50,000 bushels, and about the same amount of other tonnage, were placed at Duluth. It is claimed that there is enough freight awaiting shipment to load all available vessels from now to the close of navigation, without including iron. The losses of vessels in the tremendous storms of last week have intensified this scarcity. The vesselmen now anticipate greater

profits even than in years when rates were higher than now, on account of the decreased cost of carriage, by reason of the increased size of vessels. This makes comparisons with the past almost impossible, except in a general way.

New Texas Passenger Agreement.

The Texas lines have formed a new association, to be known as the "Southwestern Passenger Committee," with W. W. Kent, formerly General Passenger Agent of the Chicago, Peoria & St. Louis as chairman. The committee is to have the control of rates on all interstate passenger traffic, originating in or destined to the state of Texas. The headquarters of the association are in St. Louis, and its machinery includes, in addition to the chairman, an executive committee of three. The chairman's decisions are to be binding until reversed by a majority vote of the committee, and he has authority, under the agreement, to authorize the meeting of reductions caused by illegitimate methods. The membership includes the Atchison, the Rock Island, the St. Louis & San Francisco, the Missouri, Kansas & Texas, the Iron Mountain, the Texas & Pacific, the Southern Pacific, the St. Louis Southwestern and the Houston & Texas Central, and they will have the co-operation of all other lines interested in Texas traffic. The agreement provides for a restoration of all Texas passenger rates on Oct. 8. The agreement is made "upon honor," subject to termination upon 10 days' notice, and with no penalty clause attached. It is thought, however, that it will steady the situation until a general association can be re-formed, when this committee will work in harmony with the general association.

Chicago Traffic Matters.

CHICAGO, Ill., Oct. 9, 1895.

The meeting of executive officers of the Western lines, which was held last week, was a complete fizzle. Quite a number of the lines were represented, but it was found that the Missouri, Kansas & Texas was not, and that the representation from some other parts of the territory was not sufficient to warrant going ahead with the attempt to formulate a new agreement, consequently the meeting adjourned, subject to the call of the chair, after having been in session about two hours.

Prior to this meeting an attempt was made to bring about an agreement for advancing lumber rates in the Northwestern territory, but action was postponed, waiting the result of the general meeting. The matter has been since referred to a special committee to consider and report what arbitrations, above and below the Minneapolis rates, shall govern on lumber from all points in Northern Minnesota, Wisconsin and the Peninsula of Michigan, to Missouri River points. There is considerable apprehension, however, that the lumber rate situation will become still worse before rates are restored. The Kansas City, Fort Scott & Memphis has reduced the rate on yellow pine from Missouri River points to Nebraska and Kansas points, 5 cents, which still further complicates the situation.

The Atchison and the Frisco put into effect on Oct. 7 a reduced tariff on all commodities in carloads from Chicago, St. Louis and Kansas City to Colorado common point territory, practically cutting commodity rates squarely in two. The Atchison evidently intends to insert the knife deep enough to cure the manipulation now prevalent. It is doubtful, however, if even these sweeping reductions will meet the situation, as there is considerable proof in support of the assertion that Colorado rates have been secretly quoted, even below the new figures of the Atchison. In issuing the reduced tariffs, the receivers have followed their usual custom of limiting it to terminal rates, and in stating that the reduced rates are not regarded as a fair compensation for the service, but are forced by the excessive competition of other lines. The comparison of the new and old rates from Chicago is as follows:

	A	B	C	D	E
Old.....	12	107	82	67	48½
New.....	50	50	50	50	50

Passenger rates in the Northwest are in even worse shape than at any time heretofore, and unless something is done speedily a complete demoralization of transcontinental rates is likely to ensue.

Lake traffic last week showed a large increase and the demand for vessel room, especially for iron ore, coal and lumber, caused a sharp advance in coal rates, and vesselmen confidently expect to obtain \$1 a ton before the close of navigation. Shipments included 58,000 bushels of wheat, 1,590,467 bushels of corn and 546,802 bushels of oats.

Eastbound shipments all rail last week show an enormous and astonishing increase of 17,000 tons. Possibly an explanation may be found, in part at least, in the belief of the traffic men that the new eastbound agreement will become operative, which leads them to take everything in sight. An inspection of the commodity movement shows that the freight was carried in some instances largely by lines which are not usually considered legitimate routes for certain commodities.

The Alton has demanded of the Chicago Rate Sheet Committee that its new line via Peoria be included in the sheet. The other members object decidedly to this on the ground that it is a circuitous route, and to include it would offer an opportunity for a scalp on intermediate rates. The Alton, however, pursues a characteristically aggressive course and has already given notice that it will issue its own rate sheets.

The shipments of eastbound freight, not including live stock from Chicago, by all the lines for the week ending Oct. 5, amounted to 79,908 tons against 61,994 tons during the preceding week, an increase of 17,914 tons, and against 54,000 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO OCT. 5		WEEK TO SEPT. 29.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	7,047	8.8	5,874	9.5
Wabash.....	9,395	11.7	5,810	9.4
Lake Shore & Mich. South.	10,413	13.1	8,803	14.2
Pitts., Ft. Wayne & Chicgo.	10,211	12.8	7,246	11.7
Pitts., Cin., Chi. & St. Louis.	7,819	9.8	9,330	15.0
Baltimore & Ohio.....	4,560	5.7	4,201	6.8
Chicago & Grand Trunk.....	10,739	13.4	7,934	12.8
New York, Chic. & St. Louis	5,302	6.6	4,414	7.1
Chicago & Erie.....	19,833	24.8	5,839	9.4
C., C. & St. Louis.....	3,508	4.5	2,533	4.0
Total.....	79,908	100.0	61,994	100.0

Of the above shipments 2,608 tons were flour, 39,286 tons grain and mill stuff, 14,145 tons cured meats, 10,347 tons dressed beef, 1,480 tons butter, 1,458 tons hides, and 5,814 tons lumber. The three Vanderbilt lines carried 28.5 per cent.; the two Pennsylvania lines 22.6 per cent.